Missouri Public Service Commission
Manufactured Housing & Modular Units Program
Application for Modular Unit Plan Approvals

Transmittal Number (PSC Office)	Check Number	Check Amount
3757500 253	42717	$75.00

INSTRUCTIONS

Submit the completed application, plans, & fees to your Third Party to forward to: Manufactured Housing & Modular Units Program P.O. Box 360, Jefferson City, MO 65102 or 200 Madison St., 5th Fl., Jefferson City, MO 65101	**Plan Approval Fees (non-refundable): $75 per model** Make all checks and money orders payable to: **Missouri Director of Revenue**	**How to reach us:** **Phone:** 800-819-3180 **Fax:** 573-522-2509 **Web Page:** www.psc.mo.gov

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DEPARTMENT

MANUFACTURER INFORMATION

Must use the actual facility name & address where the model will be produced.

Registration Number:	12-000455	Registration Expiration Date:	
Manufacturer's Name:	Palomar Modular Buildings, LLC		
Contact Name:	Nancy Miller	Email Address:	nmiller@palomarmodular.com
Mailing Address:	P.O. Box 909	Physical Location:	505 N. Interstate 35-E
City/State/Zip:	DeSoto, TX 75123		DeSoto, TX 75115
Phone Number:	469-727-0727	Fax Number:	

THIRD PARTY INSPECTION AGENCY INFORMATION

NOTE: A letter from the authorized representative approving models listed below must be attached to this Plan Approval Form.

Third Party Agency:	PFS - Teco Corporation		
Contact Name:	Bob Gorleski	Email Address:	bob.gorleski@pfsteco.com
Mailing Address:	1507 Matt Pass		
City/State/Zip:	Cottage Grove, WI 53527		
Phone Number:	608-839-1013	Fax Number:	

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DEALER OR CONSUMER INFORMATION

Attach additional sheets if necessary.

Dealer or Consumer Name:	Lee's Summit ISD	Dealer Registration #:	
Physical Address:	301 NE Tutor Rd.	Dealer Email Address:	
City/State/Zip:	Lee's Summit, MO 64086	Phone Number:	816-986-1000

MODEL INFORMATION

Please list the models to be approved below.

NOTE: Plans are approved for a period of one year and must be renewed each year until production of the model has ceased.

Please indicate ✓ New Model	Model Revision	Model Renewal	Model Name	Model Destination- **COMPLETE ADDRESS REQUIRED** (Street Address, City, State & Zip Code)	Seismic Design Category
X			2464 Dry Classroom	27600 NE Colbern Rd Lee's Summit, MO 64086	B

New models constructed **after March 30, 2018**, shall be constructed to the criteria set forth in the 2015 International Building Code, the 2015 International Plumbing Code, the 2015 International Mechanical Code, the 2015 International Residential Code, 2015 International Fuel Gas Code, and the 2014 National Electric Code NFPA. Current models approved **prior to March 30, 2018**, are good until October 1, 2018.

According to the Public Service Commission's Rules 4CSR 240-123.010(1) governing modular units, modular units must be completed structures and must be tagged with a code compliance seal before being shipped and sold in the State of Missouri. Questions, please contact us at the above phone number.

SIGNATURE

Authorized Company Official	Date
Nancy Miller	6-23-2020
Title: Designer and CAD Drafter	

June 23, 2020

Mr. Justin Smith, Program Manager
Missouri Public Service Commission
Manufactured Housing & Modular Unit Program
P.O. Box 360
Jefferson City, MO 65102

RE: Palomar Modular Buildings, LLC
DeSoto, TX
Submittal: 2464 Dry Classroom Building

Dear Mr. Smith,

This is to certify that PFS Corporation has reviewed the plans, specifications and documentation and to the best of our knowledge have found them to conform to the Missouri Public Service Commission regulations and codes.

If you have any questions, please give us a call.

Sincerely,

Mark Severson
Plans Reviewer

Enclosures: Missouri Application for Modular Unit Plan Approvals
Missouri Plan Review Form
Copy Check #42717 for $75.00

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HOUSING

cc: Nancy Miller
File

Missouri Public Service Commission
Manufactured Housing & Modular Unit Program
Plan Review Form

To be completed by the Third Party Agency.

We, the Third Party Agency, have reviewed and approved plans from:

Manufacturer Name	Palomar Modular Buildings, LLC
Project Name	2464 Dry Classroom
Job Number	2279-2280
Number of Units	One
Location of Project (Exact Location Required)	27600 NE Colbern Rd., Lee's Summit, MO 64086

This unit meets or exceeds the:

- 2015 International Building Code (IBC)
- 2015 International Residential Code (IRC)
- 2015 International Plumbing
- 2015 International Mechanical Code
- 2015 International Fuel Gas Code
- 2014 National Electric Code (NFPA)

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Seismic Design Category (Please specify) B

An on-line inspection for compliance will be completed for the above units.

Third Party Name	PFSTECO		
Address	1507 Matt Pass, Cottage Grove, WI 53527		
Phone	608/839-1432	Fax	608/839-1014
Contact Email Address:	mark.severson@pfsteco.com		
Representative Name:	Mark Severson	Representative Title	Plan Examiner

Please send the complete plan approval submission to:
(See Plan Approval Checklist for Submission Guidelines)

Mailing Address:

Missouri Public Service Commission
Manufactured Housing & Modular Unit Program
P.O. Box 360
Jefferson City, MO 65102

Phone: 800-819-3180
Fax: 573-522-2509

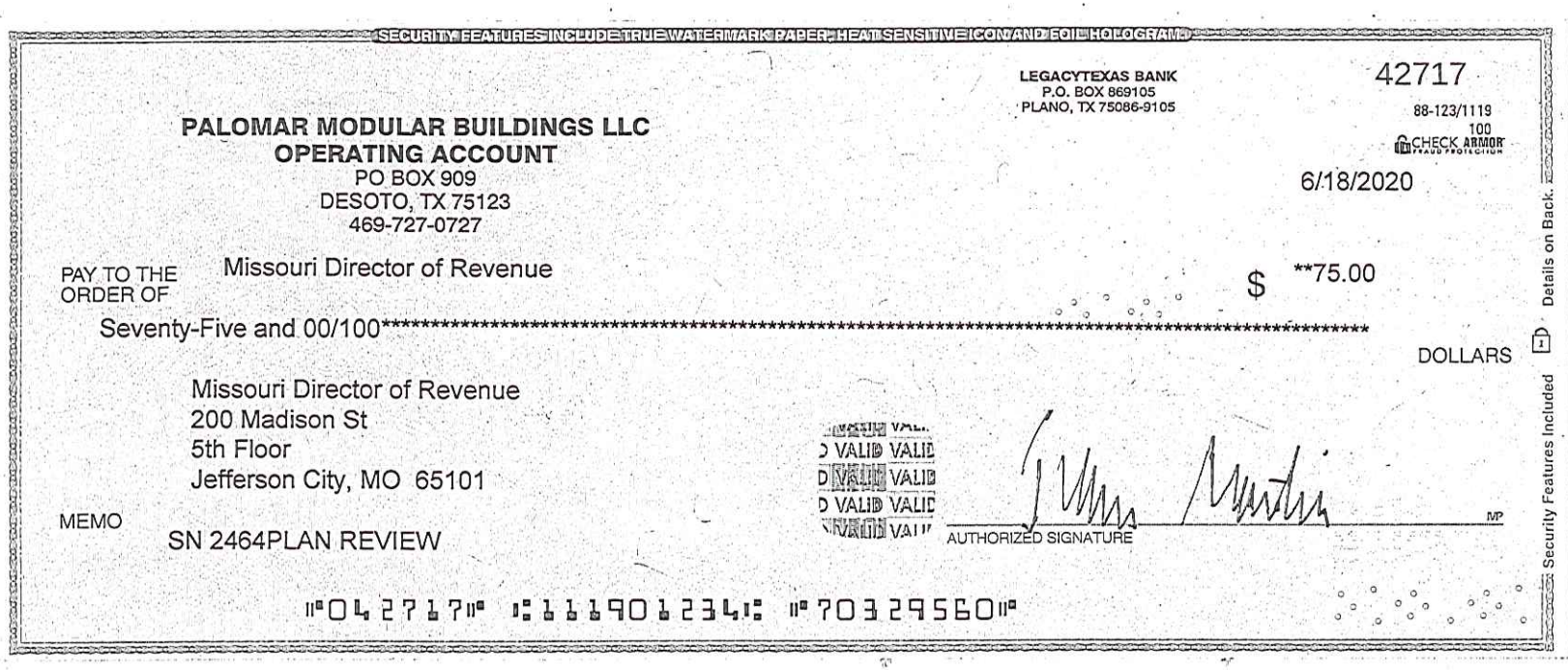
Street Address:

Missouri Public Service Commission
Manufactured Housing & Modular Unit Program
200 Madison Street, Suite 500
Jefferson City, MO 65101

Web Address: www.psc.mo.gov

This form must accompany the plan approval form as well as any other required documentation and fees.

Revised: 5/10/18



SECURITY FEATURES INCLUDE TRUE WATERMARK PAPER, HEAT SENSITIVE ICON AND FOIL HOLOGRAM

LEGACYTEXAS BANK
P.O. BOX 869105
PLANO, TX 75086-9105

42717

88-123/1119
100

CHECK ARMOR FRAUD PROTECTION

PALOMAR MODULAR BUILDINGS LLC
OPERATING ACCOUNT
PO BOX 909
DESOTO, TX 75123
469-727-0727

6/18/2020

PAY TO THE ORDER OF Missouri Director of Revenue

$ **75.00

Seventy-Five and 00/100**********

DOLLARS

Missouri Director of Revenue
200 Madison St
5th Floor
Jefferson City, MO 65101

MEMO SN 2464PLAN REVIEW

VALID VALID
VALID VALID
VALID VALID
VALID VALID

AUTHORIZED SIGNATURE

⑈042717⑈ ⑆111901234⑆ ⑈70329560⑈

Details on Back. Security Features Included

RECEIVED
JUN 23 2020
Budget & Fiscal Services
MO. P.S.C.

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Date Received at PFS:_____
IBC Transmittal No. (by PFS):_____
Project No. (by PFS):_____

ADDITIONAL OR MODIFIED ACCEPTANCE (MODULARS/PANELIZED)

This form is to be used only when the manufacturer is seeking acceptance of an additional model, modified model or model name change which uses a previously accepted building system.

Current PFS Building System Acceptance #:_____
Model Name/ No. 2464 Dry Classroom Building
Manufacturer's Name: Palomar Modular Buildings LLC
Plant(s) at which model will be produced DeSoto, Texas
Check One: ✔ NEW MODEL _____ Revised Model*

TECHNICAL DATA

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	Conforms		
Floor Plan Showing:	Yes	No	N/A
Braced Wall Method or Shearwalls	✔		
Building Size (LxW Dimensions)	✔		
Room Sizes, Light & Ventilation Schedule	✔		
Exit Requirements	✔		
Electrical Outlet Spacing & Smoke Detector	✔		
Location of Labels & Data Plates	✔		
Use Group, Type Const., Total Sq.Ft. Area	✔		
Plumbing System Design or Reference No. (N/A)			✔
Heat Loss Calculations or Reference No. (See Attached)	✔		
HVAC/Furnace Size/Model No. (See Sheet M-1)	✔		
Thermal Performance Calculations or Reference No. (See Attached)	✔		
Electrical Load Calculations or Reference No. (See Sheet E-3)	✔		
Service Size and Location (See Sheets - E-1 & E-2)	✔		
Applicable Building Codes 2015 I-Codes, 2014 NEC, ANSI A 117.1 - 2009	✔		

Submit model to the followingstates: Missouri

*Description of Modification:_____

Requested by: Nancy Miller Date: 06/10/20
(designer)

For PFS Use

Staff Plan Reviewer Mark Swenson IBC Certification #:_____ Date: 6/23/2020

Structural Calculation(s) Reviewed By:_____ P.E. #:_____ Date:_____
Remarks:_____

**(1) copy sent to IBC within 15 days of approval.*

VERBAL APPROVAL GIVEN ☐ By Whom:_____ To Whom_____ Date:_____
MODEL WAS DEVIATED ☐ Revision Number:_____

THIS FORM SHALL BE FILLED OUT COMPLETELY WITH EACH MODEL ACCEPTANCE OR MODIFICATION PRIOR TO SUBMITTAL TO PFS.

cc:_____
\forms\form-m
Rev 05/13/08 mb

LEE'S SUMMIT					6/16/2020
AHU #	Area Served	Cooling		Heating	Notes
1	West Classroom	3	tons	10 kW	
2	East Classroom	3	tons	10 kW	

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PFS **APPROVED**
DATE 6/23/20
PFS CORPORATION
Cottage Grove, WI

MISSOURI PUBLIC SERVICE COMMISSION

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07/02/2020

MANUFACTURED HOUSING

System Checksums

By James P Crockett, PE

PFS APPROVED

DATE 6/23/20

PFS CORPORATION

Cottage Grove, WI

East Classroom

Single Zone

COOLING COIL PEAK

Peaked at Time: Mo/Hr:
Outside Air: OADB/WB/HR: Sum of Peaks

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	592	592	2
Glass Solar	913	0	913	3
Glass Cond	124	0	124	0
Wall Cond	2,012	502	2,514	7
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	2,974		2,974	8
Sub Total ==>	6,024	1,094	7,118	20
Internal Loads				
Lights	2,516	629	3,145	9
People	9,450		9,450	27
Misc	1,311	0	1,311	4
Sub Total ==>	13,277	629	13,906	39
Ceiling Load	416	-416	0	0
Ventilation Load	0	0	15,248	43
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		-698	-698	-2
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	19,717	609	35,574	100.00

CLG SPACE PEAK

Mo/Hr: Sum of
OADB: Peaks

	Space Sensible Btu/h	Percent Of Total (%)
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	1,275	9
Glass Cond	114	1
Wall Cond	2,258	16
Partition	0	0
Exposed Floor	0	0
Infiltration	1,285	9
Sub Total ==>	4,932	35
Lights	2,516	18
People	4,725	34
Misc	1,311	9
Sub Total ==>	8,552	61
Ceiling Load	456	3
Ventilation Load	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	13,940	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 6

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	-1,450	4.38
Glass Solar	0	0	0.00
Glass Cond	-387	-387	1.17
Wall Cond	-2,786	-3,484	10.54
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	-4,261	-4,261	12.89
Sub Total ==>	-7,435	-9,581	28.98
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	-519	0	0.00
Ventilation Load	0	-21,847	66.08
Ov/Undr Sizing	-2,502	-2,502	7.57
Exhaust Heat		870	-2.63
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-10,455	-33,060	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Plenum	76.7	67.9
Return	76.7	67.9
Ret/OA	86.2	37.6
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	315	315
Infil	61	61
Supply	643	643
MinStop/Rh	0	0
Return	705	705
Exhaust	376	376
Rm Exh	0	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	49.0	49.0
cfm/ft²	0.84	0.84
cfm/ton	216.97	
ft²/ton	259.07	
Btu/hr·ft²	46.32	-43.05
No. People	21	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	3.0	35.6	21.2	643.2	86.2	71.2	94.2	55.0	54.2	63.2
Aux Clg	0.0	0.0	0.0	0	0	0	0	0	0	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	3.0	35.6								

AREAS

	Gross Total ft²	Glass ft²	Glass (%)
Floor	768		
Part	0		
ExFlr	0		
Roof	768	0	0
Wall	880	24	3

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-33.1	643.2	37.6	85.0
Aux Htg	0.0	0	0	0
Preheat	-12.2	643	38	55
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-33.1			

Project Name:
Dataset Name: C:\Users\jcrockett\Dropbox\Engineering\Palomar\Lee's Summit\Lees Summit.trc

MISSOURI PUBLIC SERVICE COMMISSION
APPROVED
07/02/2020
MANUFACTURED HOUSING

System Checksums

By James P Crockett, PE

PFS APPROVED
DATE 6/23/20
PFS CORPORATION
Cottage Grove, WI

West Classroom — **Single Zone**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: Outside Air: OADB/WB/HR: Sum of Peaks

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	594	594	2
Glass Solar	913	0	913	3
Glass Cond	124	0	124	0
Wall Cond	1,706	423	2,129	6
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	2,965		2,965	8
Sub Total ==>	5,708	1,017	6,725	19
Internal Loads				
Lights	2,516	629	3,145	9
People	9,450		9,450	27
Misc	1,311	0	1,311	4
Sub Total ==>	13,277	629	13,906	40
Ceiling Load	402	-402	0	0
Ventilation Load	0	0	15,199	43
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		-674	-674	-2
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	19,388	569	35,156	100.00

COOLING SPACE PEAK

Mo/Hr: Sum of OADB: Peaks

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	1,275	9
Glass Cond	114	1
Wall Cond	2,040	15
Partition	0	0
Exposed Floor	0	0
Infiltration	1,285	9
Sub Total ==>	4,715	34
Internal Loads		
Lights	2,516	18
People	4,725	34
Misc	1,311	10
Sub Total ==>	8,552	62
Ceiling Load	448	3
Ventilation Load	0	0
Dehumid. Ov Sizing		
Ov/Undr Sizing	0	0
Exhaust Heat		
Sup. Fan Heat		
Ret. Fan Heat		
Duct Heat Pkup		
Reheat at Design		
Grand Total ==>	13,715	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design OADB: 6

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	-1,449	4.41
Glass Solar	0	0	0.00
Glass Cond	-387	-387	1.18
Wall Cond	-2,786	-3,483	10.60
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	-4,261	-4,261	12.96
Sub Total ==>	-7,435	-9,581	29.14
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	-524	0	0.00
Ventilation Load	0	-21,847	66.45
Ov/Undr Sizing	-2,327	-2,327	7.08
Exhaust Heat		879	-2.67
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Grand Total ==>	-10,286	-32,875	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Plenum	76.7	67.8
Return	76.7	67.8
Ret/OA	86.3	37.1
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Vent	315	315
Infil	61	61
Supply	633	633
MinStop/Rh	0	0
Return	694	694
Exhaust	376	376
Rm Exh	0	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	49.8	49.8
cfm/ft²	0.82	0.82
cfm/ton	215.99	
ft²/ton	262.15	
Btu/hr·ft²	45.78	-42.81
No. People	21	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	2.9	35.2	20.8	632.8	86.3	71.3	94.6	55.0	54.2	63.4
Aux Clg	0.0	0.0	0.0	0	0	0	0	0	0	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	2.9	35.2								

AREAS

	Gross Total ft²	Glass ft²	Glass (%)
Floor	768		
Part	0		
ExFlr	0		
Roof	768	0	0
Wall	880	24	3

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-32.9	632.8	37.1	85.0
Aux Htg	0.0	0	0	0
Preheat	-12.3	633	37	55
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-32.9			

COM*check* Software Version 4.1.1.0

Envelope Compliance Certificate

PFS APPROVED
DATE 6/23/20
PFS CORPORATION
Cottage Grove, WI

Project Information

Energy Code:	2015 IECC
Project Title:	Lees Summit
Location:	Lees Summit, Missouri
Climate Zone:	4a
Project Type:	New Construction
Vertical Glazing / Wall Area:	3%

Construction Site:
Lees Summit, MO

Owner/Agent:
Lees Summit, MO

Designer/Contractor:
Robbie Massa
Palomar Modular Buildings
505 North I-35E
DeSoto, TX 75115
469 727-0727

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

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Building Area	Floor Area
1-School/University : Nonresidential	1515

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Roof 1: Attic Roof with Wood Joists, [Bldg. Use 1 - School/University]	1541	30.0	0.0	0.034	0.027
Exterior Wall 1: Other Wood Framed Wall, [Bldg. Use 1 - School/University] (b)	1744	---	---	0.058	0.064
Window 1: Metal Frame:Operable, Perf. Specs.: Product ID Prdouct label, SHGC 0.25, [Bldg. Use 1 - School/University] (c)	48	---	---	0.490	0.450
Door 1: Uninsulated Single-Layer Metal, Swinging, [Bldg. Use 1 - School/University]	40	---	---	0.200	0.610
Floor 1: Wood-Framed, [Bldg. Use 1 - School/University]	1514	25.0	0.0	0.039	0.033

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.
(b) 'Other' components require supporting documentation for proposed U-factors.
(c) Fenestration product performance must be certified in accordance with NFRC and requires supporting documentation.

Envelope PASSES: Design 2% better than code

Envelope Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 2015 IECC requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title	Signature	Date
	Robbie Massa	6/22/2020

PFS APPROVED
DATE 6/23/20
PFS CORPORATION
Cottage Grove, WI

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HOUSING

COMcheck Software Version 4.1.1.0

Interior Lighting Compliance Certificate

Project Information

Energy Code:	2015 IECC
Project Title:	Lees Summit
Project Type:	New Construction

Construction Site:
Lees Summit, MO

Owner/Agent:
Lees Summit, MO

Designer/Contractor:
Robbie Massa
Palomar Modular Buildings
505 North I-35E
DeSoto, TX 75115
469 727-0727

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-School/University	1515	0.78	1186
		Total Allowed Watts =	1186

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-School/University				
LED 1: Other:	1	12	45	540
			Total Proposed Watts =	540

Interior Lighting PASSES: Design 54% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2015 IECC requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title	Signature	Date
	Robbie Massa	6/22/2020

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PFS APPROVED
DATE 6/23/20
PFS CORPORATION
Cottage Grove, WI

COM*check* Software Version 4.1.1.0

Exterior Lighting Compliance Certificate

MISSOURI PUBLIC SERVICE COMMISSION
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07/02/2020
MANUFACTURED HOUSING

Project Information

Energy Code:	2015 IECC
Project Title:	Lees Summit
Project Type:	New Construction
Exterior Lighting Zone	2 (Neighborhood business district)

Construction Site:
Lees Summit, MO

Owner/Agent:
Lees Summit, MO

Designer/Contractor:
Robbie Massa
Palomar Modular Buildings
505 North I-35E
DeSoto, TX 75115
469 727-0727

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B X C)
Main entry	2 ft of door	20	Yes	40
			Total Tradable Watts (a) =	40
			Total Allowed Watts =	40
			Total Allowed Supplemental Watts (b) =	600

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 600 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Main entry (2 ft of door width): Tradable Wattage				
LED 1: LED Linear 22W:	2	2	26	52
			Total Tradable Proposed Watts =	52

Exterior Lighting PASSES: Design 92% better than code

Exterior Lighting Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 2015 IECC requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title	Signature	Date
	Robbie Massa	6/22/2020

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Mechanical Compliance Certificate

Project Information

Energy Code:	2015 IECC
Project Title:	Lees Summit
Location:	Lees Summit, Missouri
Climate Zone:	4a
Project Type:	New Construction

Construction Site:
Lees Summit, MO

Owner/Agent:
Lees Summit, MO

Designer/Contractor:
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Palomar Modular Buildings
505 North I-35E
DeSoto, TX 75115
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Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity	System Type & Description
2	HVAC System 1 (Single Zone): Heating: 1 each - Other, Electric, Capacity = 34 kBtu/h No minimum efficiency requirement applies Cooling: 1 each - Single Package Vertical AC Unit, Capacity = 36 kBtu/h, Air-Cooled Condenser, No Economizer, Economizer exception: None Proposed Efficiency = 9.00 EER, Required Efficiency: 9.00 EER Fan System: None

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2015 IECC requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title	Signature	Date
	Robbie Massa	6/22/2020

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Inspection Checklist

Energy Code: 2015 IECC

Requirements: 100.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR1][1]	Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C103.2 [PR2][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C103.2 [PR4][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C103.2 [PR8][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.4.1 [PR10][1]	The vertical fenestration area <= 30 percent of the gross above-grade wall area.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.4.1 [PR11][1]	The skylight area <= 3 percent of the gross roof area.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C402.4.2 [PR14][1]	In enclosed spaces > 2,500 ft2 directly under a roof with ceiling heights >15 ft. and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, non-refrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the following requirements apply: (a) the daylight zone under skylights is >= half the floor area; (b) the skylight area to daylight zone is >= 3 percent with a skylight VT >= 0.40; or a minimum skylight effective aperture >= 1 percent.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

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Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C303.2.1 [FO6][1]	Exterior insulation protected against damage, sunlight, moisture, wind, landscaping and equipment maintenance activities.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.2.6 [FO12][3]	Radiant heating systems panels insulated to >=R-3.5 on face opposite space being heated.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Envelope Assemblies table for values.*
C403.2.4.5, C403.2.4.6 [FO9][3]	Snow/ice melting system sensors for future connection to controls. Freeze protection systems have automatic controls installed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

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Section # & Req.ID	Framing / Rough-In Inspection	Complies?	Comments/Assumptions
C303.1.3 [FR12][2]	Fenestration products rated in accordance with NFRC.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C303.1.3 [FR13][1]	Fenestration products are certified as to performance labels or certificates provided.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.4.3 [FR10][1]	Vertical fenestration SHGC value.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.4.3, C402.4.3.4 [FR8][1]	Vertical fenestration U-Factor.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.4.4 [FR14][2]	U-factor of opaque doors associated with the building thermal envelope meets requirements.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.5.1.2.1 [FR19][1]	The building envelope contains a continuous air barrier that is sealed in an approved manner and material permeability <= 0.004 dfm/ft2. Air barrier penetrations are sealed in an approved manner.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.5.2, C402.5.4 [FR18][3]	Factory-built fenestration and doors are labeled as meeting air leakage requirements.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.5.7 [FR17][3]	Vestibules are installed on all building entrances. Doors have self-closing devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

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Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 [ME41][3]	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.5.5, C403.2.4.3 [ME3][3]	Stair and elevator shaft vents have motorized dampers that automatically close.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C402.5.5, C403.2.4.3 [ME58][3]	Outdoor air and exhaust systems have motorized dampers that automatically shut when not in use and meet maximum leakage rates. Check gravity dampers where allowed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.2.12.1 [ME65][3]	HVAC fan systems at design conditions do not exceed allowable fan system motor nameplate hp or fan system bhp.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. *See the Mechanical Systems list for values.*
C403.2.12.3 [ME117][2]	Fans have efficiency grade (FEG) >= 67. The total efficiency of the fan at the design point of operation <= 15% of maximum total efficiency of the fan.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.13 [ME71][2]	Unenclosed spaces that are heated use only radiant heat.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.3 [ME55][2]	HVAC equipment efficiency verified.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
C403.2.6.1 [ME59][1]	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.6.2 [ME115][3]	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.7 [ME57][1]	Exhaust air energy recovery on systems meeting Table C403.2.7(1) and C403.2.7(2).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.8 [ME116][3]	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.9 [ME60][2]	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.2.9 [ME10][2]	Ducts and plenums sealed based on static pressure and location.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.9.1.3 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. *See the Mechanical Systems list for values.*
C408.2.2.1 [ME53][3]	Air outlets and zone terminal devices have means for air balancing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.5, C403.5.1, C403.5.2 [ME123][3]	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.5.1 and refrigeration compressor systems that comply with C403.5.2..	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

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Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.1 [EL15][1]	Lighting controls installed to uniformly reduce the lighting load by at least 50%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.1 [EL18][1]	Occupancy sensors installed in required spaces.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.1, C405.2.3 [EL23][2]	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.2.1 [EL22][2]	Automatic controls to shut off all building lighting installed in all buildings.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.3 [EL16][2]	Daylight zones provided with individual controls that control the lights independent of general area lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.3, C405.2.3.1, C405.2.3.2 [EL20][1]	Primary sidelighted areas are equipped with required lighting controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.3, C405.2.3.1, C405.2.3.3 [EL21][1]	Enclosed spaces with daylight area under skylights and rooftop monitors are equipped with required lighting controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.4 [EL4][1]	Separate lighting control devices for specific uses installed per approved lighting plans.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.4 [EL8][1]	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.2.5 [EL25][null]	Automatic lighting controls for exterior lighting installed. Controls will be daylight controlled, set based on business operation time-of-day, or reduce connected lighting > 30%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.3 [EL6][1]	Exit signs do not exceed 5 watts per face.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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Additional Comments/Assumptions:

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Section # & Req.ID	Insulation Inspection	Complies?	Comments/Assumptions
C303.1 [IN3][1]	Roof insulation installed per manufacturer's instructions. Blown or poured loose-fill insulation is installed only where the roof slope is <=3 in 12.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C303.1 [IN10][2]	Building envelope insulation is labeled with R-value or insulation certificate providing R-value and other relevant data.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C303.2 [IN7][1]	Above-grade wall insulation installed per manufacturer's instructions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C303.2, C402.2.4 [IN9][2]	Floor insulation installed per manufacturer's instructions. Cavity or structural slab insulation installed in permanent contact with underside of decking or structural slabs.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C303.2.1 [IN14][2]	Exterior insulation is protected from damage with a protective material. Verification for exposed foundation insulation may need to occur during Foundation Inspection.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.2.1 [IN17][3]	Insulation intended to meet the roof insulation requirements cannot be installed on top of a suspended ceiling. Mark this requirement compliant if insulation is installed accordingly.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.2.3 [IN6][1]	Above-grade wall insulation R-value.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.2.5 [IN8][2]	Floor insulation R-value.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.2.6 [IN18][3]	Radiant panels and associated components, designed for heat transfer from the panel surfaces to the occupants or indoor space are insulated with a minimum of R-3.5.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.2.2 [IN2][1]	Roof R-value. For some ceiling systems, verification may need to occur during Framing Inspection.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
C402.5.1.1 [IN1][1]	All sources of air leakage in the building thermal envelope are sealed, caulked, gasketed, weather stripped or wrapped with moisture vapor-permeable wrapping material to minimize air leakage.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.2 [FI17][3]	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C303.3, C408.2.5.3 [FI8][3]	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.5.3 [FI51][3]	Where open combustion air ducts provide combustion air to open combustion fuel burning appliances, the appliances and combustion air opening are located outside the building thermal envelope or enclosed in a room, isolated from inside the thermal envelope. Such rooms are sealed and insulated.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.5.6 [FI37][1]	Weatherseals installed on all loading dock cargo doors.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C402.5.8 [FI26][3]	Recessed luminaires in thermal envelope to limit infiltration and be IC rated and labeled. Seal between interior finish and luminaire housing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.2 [FI27][3]	HVAC systems and equipment capacity does not exceed calculated loads.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.1.2 [FI38][3]	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.1.3 [FI20][3]	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.2 [FI39][3]	Each zone equipped with setback controls using automatic time clock or programmable control system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.2.1, C403.2.4.2.2 [FI40][3]	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C405.4.1 [FI18][1]	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Interior Lighting fixture schedule for values.*
C405.5.1 [FI19][1]	Exterior lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Exterior Lighting fixture schedule for values.*
C408.2.1 [FI28][1]	Commissioning plan developed by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.3.1 [FI31][1]	HVAC equipment has been tested to ensure proper operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.3.2 [FI10][1]	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.4 [FI29][1]	Preliminary commissioning report completed and certified by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.1 [FI7][3]	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.1 [FI16][3]	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.3 [FI43][1]	An air and/or hydronic system balancing report is provided for HVAC systems.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.4 [FI30][1]	Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.3 [FI33][1]	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

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Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

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Project: 2464 Dry Classroom

U-Factor calculation for exterior wall assembly

Per Chapter 25 of the ASHRAE Handbook Fundamentals

R-Value Calculation	Cavity	Framing	Reference
Outside Surface Air	0.17	0.17	Table 1, Chapter 25 ASHRAE Handbook Fundamentals
Siding Material - Metal	0.05	0.05	ColoradoENERY.org Professionals Corner R-Value Table
Sheathing - 7/16 OSB	0.545	0.545	Table 4, Chapter 25 ASHRAE Handbook Fundamentals
Fiberglass Insulation	18	0	Insulation Packaging
Studs - 2x6 SYP	0	6.875	Pocket Reference by Thomas J Glover, 3rd Edition[1]
Gypsum - 5/8" Type "X"	0.625	0.625	Table 4, Chapter 25 ASHRAE Handbook Fundamentals
Inside Surface Air	0.68	0.68	Table 1, Chapter 25 ASHRAE Handbook Fundamentals
Total R-Value	20.07	8.945	
U-Factor (1/R)	0.050	0.112	
% of wall area	0.868	0.132	
Uav for category	0.043	0.015	
Uav Total	0.058		

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STRUCTURAL CALCULATIONS PACKAGE

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Client : Palomar Modular Buildings

Project No : 2279-2280

Project Name : Dry Classroom Building

Location : Classroom Lee's Summit MO

Subject : Modular 23.67'x64'

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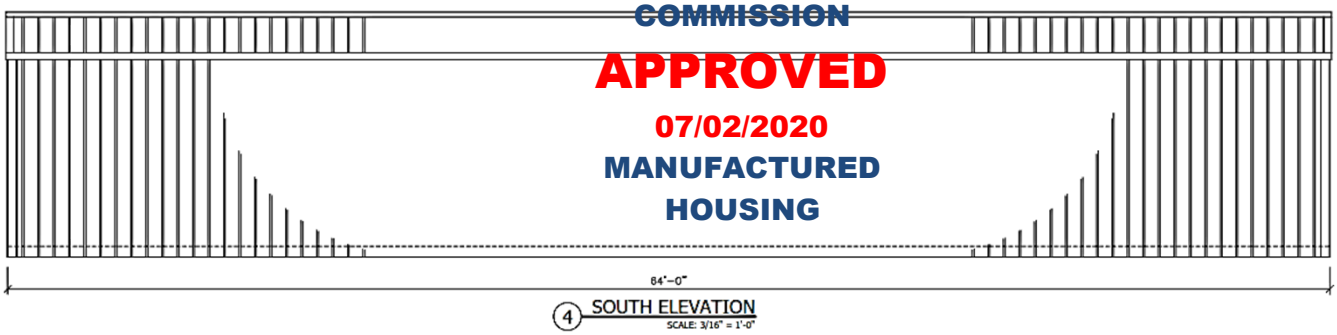
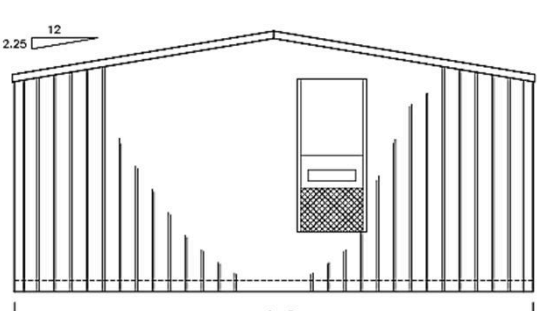


4 SOUTH ELEVATION
SCALE: 3/16" = 1'-0"



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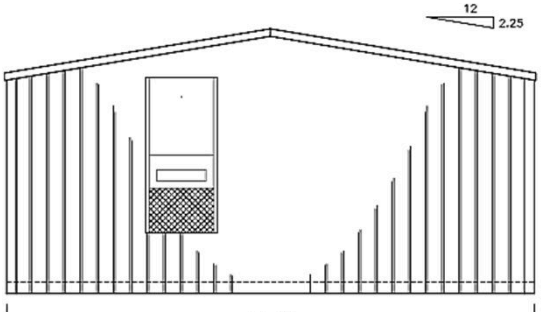
SCALE: 3/16" = 1'-0"



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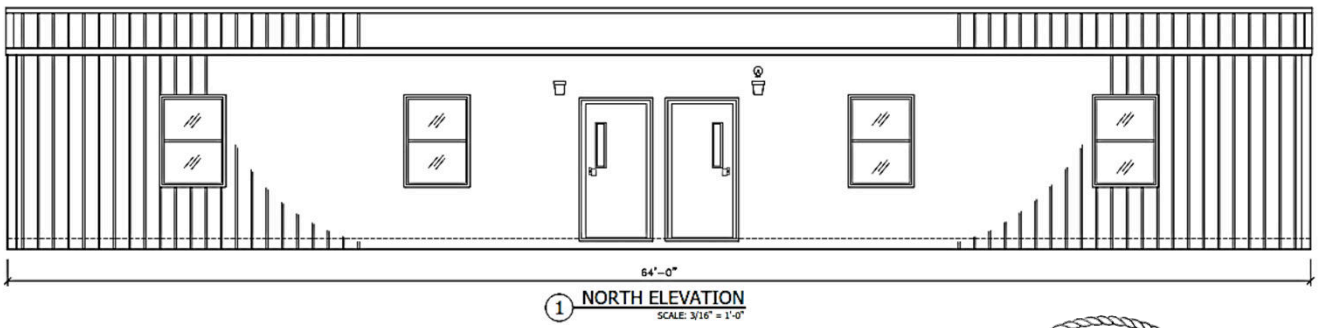
SCALE: 3/16" = 1'-0"



1 NORTH ELEVATION
SCALE: 3/16" = 1'-0"

Prepared By:

MODULAR STRUCTURAL CONSULTANTS

Yuri Yurianto, S.E., P.E., M.Sc.
5760 Legacy Dr. B3-333. Plano, TX 75024
(972) 896-5373
yurianto@modularconsultant.com
MSC Project No : M20027
Date: 6/11/2020
Rev: Final

STATE OF MISSOURI
YURIANTO
YURIANTO
NUMBER
PE-2016009131
PROFESSIONAL ENGINEER

By Yuri at 4:21:25 PM, 6/11/2020

Company :	Modular Structural Consultants, LLC.	Project No :	2279-2280	MSC#	M20027
Engineer :	Yuri Yurianto, S.E., P.E., M.Sc.	Project Name :	Dry Classroom Building		
Address :	5760 Legacy Dr. B3-333. Plano, TX 75024	Location :	Classroom Lee's Summit MO		
Phone:	(972) 896-5373	Subject :	Modular 23.67'x64'		
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

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By Yuri at 4:21:29 PM, 6/11/2020

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ATC HAZARDS BY LOCATION

https://hazards.atcouncil.org/

Address: **Classroom Lee's Summit MO**

MO Missouri ASCE 7-10

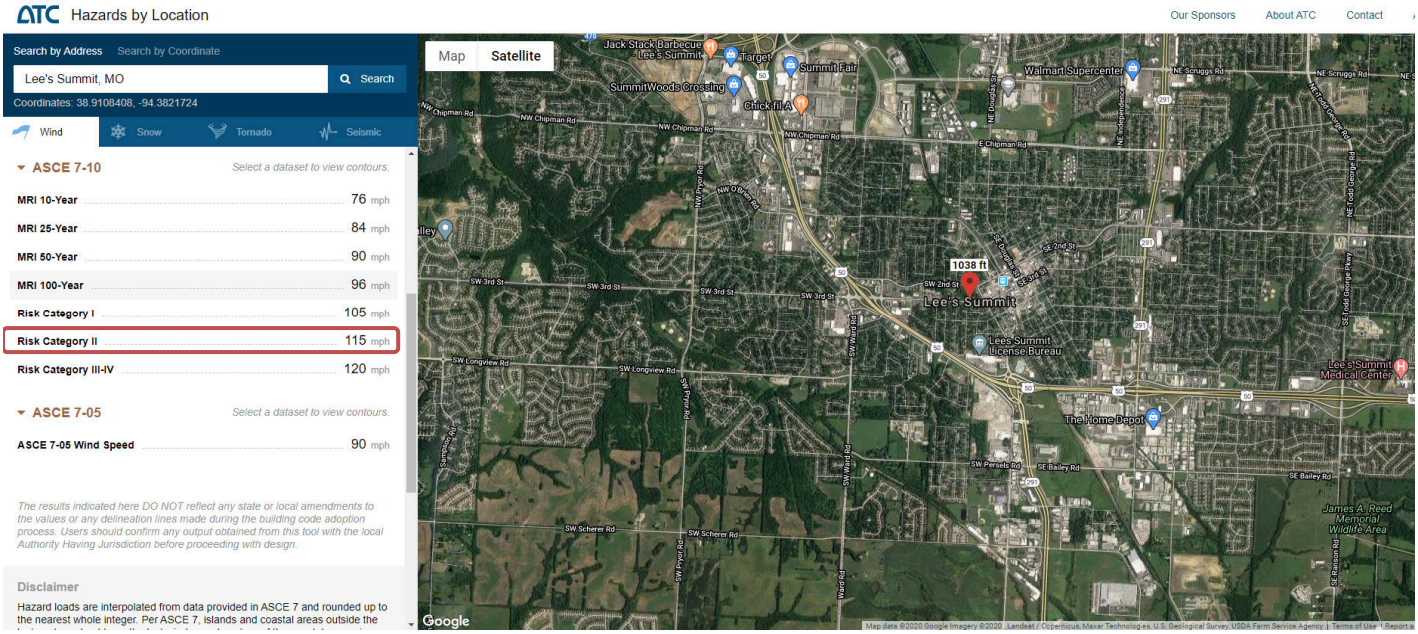
Design load code **ASCE 7-10**

Risk Category **II**

Wind Speed **115** mph

Ground Elevation **1038** ft from sea level

Wind Exposure Category **B**



Seismic S_s = **0.114** g

S_1 = **0.067** g

Soil class **D**

Ground Snow p_g = **20.00** psf

Non Reducible Roof Snow **n/a**

Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

Print these results | Save these results

ASCE 7-10 *Select a dataset to view contours.*

Ground Snow Load ..... 20 lb/sqft

Basic Parameters

Name	Value	Description
S_S	0.114	MCE_R ground motion (period=0.2s)
S_1	0.067	MCE_R ground motion (period=1.0s)
S_{MS}	0.182	Site-modified spectral acceleration value
S_{M1}	0.16	Site-modified spectral acceleration value
S_{DS}	0.121	Numeric seismic design value at 0.2s SA
S_{D1}	0.107	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	B	Seismic design category

Local Jurisdiction Requirements

County: Jackson County

Weblink: https://www.jacksongov.org/

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DESIGN CRITERIA

	Design load code ASCE 7-10		ASCE 7-10					
Roof Live Load	Min. Uniform load	$L_{o\ roof}$ =	20	psf				
	Min. Concentated load	L_{conc} =	300	lb				
Floor Live Load	Schools - Classrooms	$L_{o\ floor}$ =	40	psf	L_{conc} =	1000	lb	
Snow Load	Roof Type		Gable					
	Ground snow loads	p_g =	20.00	psf				
	Terrain category		B					
	Exposure of roof		Fully Exposed					
	Risk category		II					
	Thermal factor	C_t =	1.10					
	Exposure factor	C_e =	0.9					
	Importance factor for snow loads	I_s =	1.00					
	Roof surface type		All Other Surfaces					
	Roof slope factor	C_s =	1.000					
	Flat roof snow	p_f =	20.00	psf				
	Sloped roof snow Load	p_s =	20.00	psf				
	Non reducible roof snow n/a		n/a					
Wind Load	Risk category		II					
	Wind exposure category		B					
	Basic wind speed	V =	115	mph				
	Ground elevation above sea level	z_g =	1038	ft				
	Wind importance factor	I_w =	1.00					
	Gust-effect factor	G =	0.85					
	Wind exposure category	K_h =	0.57					
	Ground Elevation Factor	K_e =	0.96					
	Wind Directional Factor	K_d =	0.85					
	Internal Pressure Coefficient	(G C_{pi}) =	+/- 0.18					
	Topographic factor	K_{zt} =	1.0					
	Mean roof velocity pressure	q_h =	16.54	psf				
Seismic Load	Soil site classification		D					
	Soil type		Stiff soil					
	Risk Category		II					
	Importance factor	I_e =	1.00					
	Short period ground acceleration	S_s =	0.114	g				
	1-second ground acceleration	S_1 =	0.067	g				
	Short period site coefficient	F_a =	1.600					
	Long period site coefficient	F_v =	2.400					
	For short periods, F_a S_s	S_{MS} =	0.182	g				
	For 1-second period, F_v S_1	S_{M1} =	0.161	g				
	For short periods, 2/3 S_{MS}	S_{DS} =	0.122	g				
	For 1-second period, 2/3 S_{M1}	S_{D1} =	0.107	g				
	Seismic Design Category		B					

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Phone:	(972) 896-5373	Subject :	Modular 23.67'x64'		
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

DEAD LOADS Code ASCE 7-10 ASCE 7-10 [Table C3-1, pg. 399]

Summary

Roof & Ceiling dead load	12.00	$DL_{R\&C}$ =	**12.00**	psf
Exterior wall dead load	12.00	$DL_{Wallext}$ =	**12.00**	psf
Interior wall dead load	6.00	$DL_{Wallint}$ =	**6.00**	psf
Floor dead load	12.00	DL_{Floor} =	**12.00**	psf

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LIVE LOAD

Roof Live Load [Section 4.8, pg. 15]

Roof ID		*Main Roof*				
Design load code	ASCE 7-10	ASCE 7-10				
Roof type		Ordinary - flat, pitched or curved.				
Roof shape		Flat or Pitched				
Pitched roof angle	10.39	θ =	10.39	degrees	.	

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Min. Uniform load	20	$L_{o\ roof}$ =	20	psf	Reduction permited ?	Yes	[Table 4-1, pg. 18]
Uniform roof live load reduction	Yes	$L_r = L_o R_1 R_2$					

		Roof Rafter		*Ridge Beam*	
Member Span	L =	12.04	ft	64.00	ft
Member Tributary Width	W_t =	2.00	ft	11.83	ft
Tributary area	A_t =	24	ft^2	757	ft^2
Number of inch of rise per foot	F =	2.20		2.20	
R_1 = 1 for $A_t \le 200\ ft^2$; 1.2-0.001 A_t for $200\ ft^2 < A_t < 600\ ft^2$; 0.6 for $A_t \ge 600\ ft^2$	R_1 =	1.00		0.60	
R_2 = 1 for $F \le 4$; 1.2 - 0.05 F for $4 < F < 12$; 0.6 for $F \ge 12$	R_2 =	1.00		1.00	
$L_r = L_o R_1 R_2$ (12 psf ≤ L_r ≤ 20 psf)	$L_o R_1 R_2$ =	20.0	psf	12.0	psf
Design uniform roof live load	L_r =	**20.0**	psf	**12.0**	psf
Min. Concentated load	L_{conc} =	**300**	lb	**300**	lb

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Note: Uniform load is to be applied on horizontal projection supported by the member.
Concentrated load is to be applied to roof primary member
Concentrated load shall be located so as to produce the max. load effects in the members

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Floor Live Load [Section 4.7, pg. 14]

Occupancy or Use		Schools - Classrooms				
Min. Uniform load	40	$L_{o\ floor}$ =	40	psf		[Table 4-1, pg. 17]
Reduction permitted?	Yes		Yes			
Is partition exist?			No	.		
Additional partition load	0		0	psf	0	[Section 4.3.2]
Floor ID			*Floor Joists*			
Member Tributary Length		L =	11.83	ft		
Member Tributary Width		W_t =	1.33	ft		
Tributary area		A_t =	16	ft^2		
Element			Interior beams			
Live load element factor	2	K_{LL} =	2		2	[Table 4-2, pg. 20]
Element influence area		$K_{LL}\ A_t$ =	32	ft^2		

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Formula of live load reduction

$$L_L = L_o\left(0.25 + \frac{15}{\sqrt{K_{LL}A_T}}\right)$$

, $L_{L\ min}$ = 0.50 L_o
, $(K_{LL}\ A_t)_{min}$ = 400 ft^2

Design uniform floor live load		L_L =	**40**	psf		
Min. Concentated load	1000	L_{conc} =	**1000**	lb		
distributed over 2.5ft x 2.5ft area		=	160	psf		[Section 4.4]

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Note: Uniform load is to be applied on horizontal projection supported by the member.
Concentrated load shall be located so as to produce the max. load effects in the members

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SNOW LOAD *ID* *Main Roof* [ASCE 7-10, Chap. 7. pg. 29]

Design load code	ASCE 7-10	ASCE 7-10				
Roof Type	Gable	Gable				
Ground snow loads	20.00	p_g =	20.00	psf		[Fig. 7-1. pg. 34]
Horizontal distance from eave to ridge	11.83	W =	11.83	ft	(Typically 1/2 L)	
Roof angle	10.39	Θ =	10.39	degrees		
Terrain category	B		B			[Table 7-2., pg. 30]
Exposure of roof			Fully Exposed			[Table 7-2., pg. 30]
Risk category	II		II			[Table 1.5-1., pg. 2]
Thermal factor		C_t =	1.10		Warm roofs: C_t = 0.85 or C_t = 1.0 Cold roofs: C_t = 1.1 or C_t = 1.2 Below freezing: C_t = 1.3	[Table 7-3. pg. 30]
Exposure factor		C_e =	0.9			[Table 7-2. pg. 30]
Importance factor for snow loads	1.00	I_s =	1.00			[Table 1.5-2. pg. 5]
Roof surface type			All Other Surfaces			[Section 7.4. pg. 31]
Roof slope factor		C_s =	1.000			[Fig. 7-2. pg. 36]

Roof Slope, Θ	C_s
< 37.5	1
10.39	1.83
70	0

$C_{s\ approx.}$ = 1.000

Non Reducible Roof Snow

p_s = n/a psf

Flat Roof Snow Loads

$p_f = 0.7\ C_e\ C_t\ I_s\ p_g$		p_f =	13.86	psf	[Eq. 7.3-1, pg. 29]
p_f min for roof slope < 15 degrees		p_m =	20.00	psf	[7.3.4., pg. 29]
Flat roof snow	20.00	p_f =	20.00	psf	

Sloped Roof Snow Loads [Fig. 7-5, pg. 39]

Balanced Snow Load	$p_s = C_s\ p_f$	20.00	p_s =	20.00	psf	[Eq. 7.4-1, pg. 31]
Unbalanced Snow Load W ≤ 20ft, with roof rafter system			$I_s\ p_g$ =	**20.00**	psf	

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Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

Unbalanced Snow Load , Other [Fig. 7-5, pg. 39]

Roof slope run for a rise of one, S = 1 / tan (Θ) S = 5.453

Snow density γ = 0.13 p_g + 14 ≤ 30 pcf [Eq. 7.7-1, pg. 33]

0.13 p_g + 14 = 16.60 pcf < 30 pcf

Use γ = 16.60 pcf

Eave to ridge distance, l_u = W — l_u = 11.83 ft — $l_{u\,min}$ = 20 ft [7.6.1, pg. 32]
For windward portion of the roof

Use l_u = 20.00 ft For Fig. 7-9 at pg. 41

Height of snow drift $h_d = 0.43 \sqrt[3]{l_u}\ \sqrt[4]{p_g + 10} - 1.5$ [Eq. for Fig. 7-9, pg. 41]

h_d = 1.23 ft

Leeward surcharge snow load length from ridge $\left(\frac{8}{3}\right) h_d \sqrt{S}$ = **7.67** ft

Leeward surcharge snow load magnitude $h_d \gamma / \sqrt{S}$ = **8.76** psf

Windward unbalanced snow load magnitude 0.3 p_s = **6.00** psf

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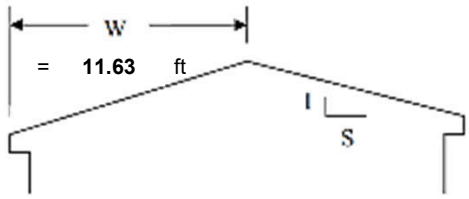
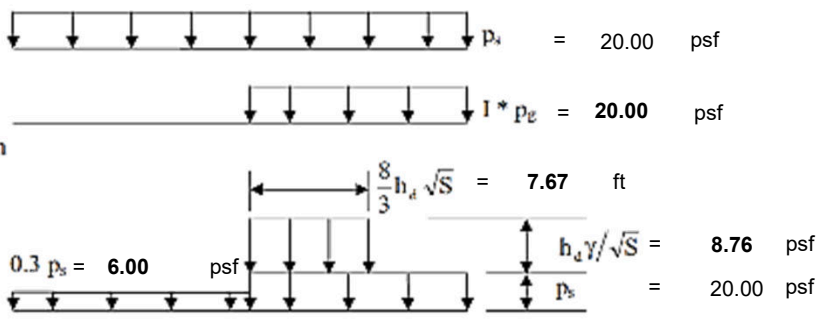
Summary of snow load [Fig. 7-5, pg. 39]



Non-reducible roof snow load
p_s = n/a psf



Note: Unbalanced snow loads need not be considered
for θ > 30.2° (7 on 12) or for θ < 2.38° (1/2 on 12)

Roof angle θ = 10.39 degrees
Unbalanced snow loads need to be considered

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WIND LOAD *ID* *All Structures*

Design load code	ASCE 7-10	ASCE 7-10				
Structural type		Buildings - Main Wind Force Resisting System				[Table 26.6-1, pg. 250]
Roof type		Gable				
Risk category	II	II				[Table 1.5-1, pg. 2]
Enclosure classification		Enclosed buildings				[Table 26.11-1, pg. 258]
Wind exposure category	B	B				[Section 26.7.3, pg. 251]
Basic wind speed	115	V =	115	mph		[Figure 26.5-1, pg. 250-257]
Building span		L =	23.7	ft		
Building length		B =	64.0	ft		
Roof peak height		h_r =	13.8	ft		
Roof eave height		z =	11.6	ft		
Mean roof height	12.7	h =	12.7	ft		
Roof slope		θ =	10.4	degrees	y (ft) 2.17 / x (ft) 11.83	$\tan^{-1}$ (y/x) 10.39
Ground elevation above sea level	1038	z_g =	1038	ft		
Wind importance factor		I_w =	1.00			[Table 1.5-2, pg. 5]
Gust-effect factor		G =	0.85			[Section 26.9.1, pg. 254]

Wind exposure category — [Table 27.3-1, pg. 261]

$K_h = 2.01\ (h / z_g)^{2/\alpha}$ $\quad K_z = 2.01\ (z / z_g)^{2/\alpha}$

α =	7	α =	7
z_g =	1200	z_g =	1200
K_h =	0.57	K_z =	0.57

Ground Elevation Factor — [Not applicable, pg. -]

$K_e = e^{-0.0000362\ zg}$

K_e = 0.96

Wind Directional Factor		K_d =	0.85			[Table 26.6-1, pg. 250]
Internal Pressure Coefficient		(G C_{pi}) =	+/- 0.18			[Table 26.11-1, pg. 258]
Topographic factor		K_{zt} =	1.0			[Section 26.8.2, pg. 254]
Velocity pressure		q_h =	16.54	psf	q_z = 16.54 psf	[Eq. 27.3-1, pg. 260]

ASCE 7-10 $q_{h\ (or\ z)} = 0.00256\ K_{h\ (or\ z)}\ K_{zt}\ K_d\ V^2$

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Company :	Modular Structural Consultants, LLC.	Project No :	2279-2280	MSC#	M20027
Engineer :	Yuri Yurianto, S.E., P.E., M.Sc.	Project Name :	Dry Classroom Building		
Address :	5760 Legacy Dr. B3-333. Plano, TX 75024	Location :	Classroom Lee's Summit MO		
Phone:	(972) 896-5373	Subject :	Modular 23.67'x64'		
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

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Components and Cladding **For Walls, h ≤ 60 ft** ASCE 7-10

Enclosed, Partially Enclosed Buildings [Figure 30.4-1, pg. 335]

Mean roof height h = 12.7 ft

Roof slope θ = 10.4 degrees

External Pressure Coefficient, GCp (Ext.)

Member Location	Zone	Span Length	[1] Effective Width Actual	[1/3 Span]	[2] C&C Trib. Area (Span x Eff. Width)		[3] GC_p Use →	For Walls, h ≤ 60ft with q_h	with q_h	[4] GC Use →	For Walls, h > 60ft with q_h	with q_z
		(ft)	(ft)	(ft)								
Int. zone wall stud	Zone 4	10.00	1.33	3.3	33	ft^2		-1.01	0.91		-0.87	0.85
End zone wall stud	Zone 5	10.00	1.33	3.3	33	ft^2		-1.22	0.91		-1.67	0.85
Int. zone door jamb	Zone 4	10.00	3.00	3.3	33	ft^2		-1.01	0.91		-0.87	0.85
Int. zone wall panel	Zone 4	3.00	3.00	1.0	9	ft^2		-1.10	1.00		-0.90	0.90
End zone wall pane	Zone 5	3.00	3.00	1.0	9	ft^2		-1.40	1.00		-1.80	0.90

Note:
1. Effective width need not be less than one-third span length per definition in Chap. 26.
2. C&C tributary areas greater than 700 ft^2 shall be permitted to be designed using MWFRS, per Section 30.2.3.
3. Value of GC_p for walls shall be reduced by 10%, when θ ≤ 10° and h ≤ 60ft. Adjustment factor = 1.00
4. For h ≤ 60ft, (CGp) to be used with q_h. For h > 60ft. Use q_z with positive value of (GC_p) and q_h with negative value of (GC_p).

Building Enclosure Category Enclosed buildings [Table 26.11-1, pg. 258]

Positive internal pressure 0.18 $(+GC_{pi})$ = 0.18

Negative internal pressure -0.18 $(-GC_{pi})$ = -0.18

Velocity pressure q_h = 16.54 psf q_z = 16.54 psf [Eq. 27.3-1, pg. 260]

Design Wind Pressure of Walls - Components and Cladding

$$q_{h \text{ or } z} [(GC_p) - (\pm GC_{pi})]$$

Member Location	Zone	[Negative Pressure] $q_h [(GC_p)_{Neg} - (+GC_{pi})]$	[Positive Pressure] $q_{h \text{ or } z} [(GC_p)_{Pos} - (-GC_{pi})]$	[Comments]
Int. zone wall stud	Zone 4	-19.64 psf	17.99 psf	
End zone wall stud	Zone 5	-23.08 psf	17.99 psf	
Int. zone door jamb	Zone 4	-19.64 psf	17.99 psf	
Int. zone wall panel	Zone 4	-21.17 psf	19.52 psf	
End zone wall pane	Zone 5	-26.13 psf	19.52 psf	

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Note: Minimum C&C design wind pressure +/- 16.0 psf [Section 30.2.2, pg. 316]
Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
ASCE 7-10 design wind pressures are at ultimate load level.

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Components and Cladding **For Flat Roofs, h ≤ 60 ft**

Enclosed, Partially Enclosed Buildings [Figure 30.4-1, pg. 335]

Mean roof height h = 12.7 ft

Roof slope θ = 10.4 degrees

External Pressure Coefficient, GCp

Member Location	Zone	Span Length (ft)	[1] Effective Width Actual (ft)	[1/3 Span] (ft)	[2] C&C Trib. Area (Span x Eff. Width)	[3] GC_p Use →	For Roofs, h ≤ 60ft with q_h	[4] GC_p Use →	(Not Applicable) For Roofs, h > 60ft with q_h
Member zone 1	Zone 1	12.00	1.33	4.0	48 ft²		-1.42		-1.20
Member zone 2	Zone 2	12.00	1.33	4.0	48 ft²		-1.94		-2.02
Roof panel zone 1	Zone 1	3.00	3.00	1.0	9 ft²		-1.70		-1.40
Roof panel zone 2	Zone 2	3.00	3.00	1.0	9 ft²		-2.30		-2.30
Roof panel zone 3	Zone 3	3.00	3.00	1.0	9 ft²		-3.20		-3.20

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Note:
1. Effective width need not be less than one-third span length per definition in Chap. 26.
2. C&C tributary areas greater than 700 ft² shall be permitted to be designed using MWFRS, per Section 30.2.3.
3. Value of GC_p for walls shall be reduced by 10%, when θ ≤ 10° and h ≤ 60ft. Adjustment factor = 1.00
4. For h ≤ 60ft, (CGp) to be used with q_h. For h > 60ft. Use q_z with positive value of (GC_p) and q_h with negative value of (GC_p).

Building Enclosure Category Enclosed buildings [Table 26.11-1, pg. 258]

Positive internal pressure 0.18 $(+GC_{pi})$ = 0.18

Negative internal pressure -0.18 $(-GC_{pi})$ = -0.18

Velocity pressure q_h = 16.54 psf q_z = 16.54 psf [Eq. 27.3-1, pg. 260]

Design Wind Pressure of Walls - Components and Cladding

$q_h [(GC_p) - (\pm GC_{pi})]$

Member Location	Zone	$q_h [(GC_p)_{Neg} - (+GC_{pi})]$	$q_h [(GC_p)_{Pos} - (-GC_{pi})]$	[Comments]
Member zone 1	Zone 1	-26.45 psf	-20.50 psf	
Member zone 2	Zone 2	-35.05 psf	-29.09 psf	
Roof panel zone 1	Zone 1	-31.09 psf	-25.14 psf	
Roof panel zone 2	Zone 2	-41.02 psf	-35.06 psf	
Roof panel zone 3	Zone 3	-55.90 psf	-49.95 psf	

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Note: Minimum C&C design wind pressure +/- 16.0 psf [Section 30.2.2, pg. 316]

Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.

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Wind load on buildings - MWFRS (Directional Procedures) For All Heights [Figure 27.3-1]

A. Velocity pressures $q = 0.00256\ K_z\ K_{zt}\ K_d\ K_e\ V^2$ (psf)

Wind velocity pressure at Mean roof height	$q_h =$	15.93	psf	at h = 12.73 ft
Wind velocity pressure at Eave height	$q_z =$	15.93	psf	at z = 11.64 ft
Wind velocity pressure at 0 to 15 ft	$q_{z\ 0\text{-}15} =$	15.80	psf	at z = 0 to 15 ft

B. External and internal wind pressures

External wind pressure, qGC_p

I. Wall Wind Pressures

a. Windward wall	$q_zGC_p =$	10.83	psf	at eave height
b. Leeward wall	$q_hGC_p =$	-6.77	psf	
c. Side walls	$q_hGC_p =$	-9.48	psf	
d. Windward wall	$q_{z\ 0\text{-}15}GC_p =$	10.74	psf	at 0 to 15 ft

II. Roof Wind Pressures

i. Wind Direction Normal to Ridge

a. Windward roof				
Maximum suction	$q_hGC_p =$	-12.37	psf	
Minimum suction	$q_hGC_p =$	-2.44	psf	
b. Leeward roof	$q_hGC_p =$	-6.97	psf	

ii. Wind Direction Parallel to Ridge

Maximum suction	$q_hGC_p =$	-11.98	psf	
Minimum suction	$q_hGC_p =$	-2.44	psf	

Internal wind pressure, q_iGC_{pi}

Positive internal pressure	$q_hGC_{pi} =$	2.87	psf	
Negative internal pressure	$q_hGC_{pi} =$	-2.87	psf	

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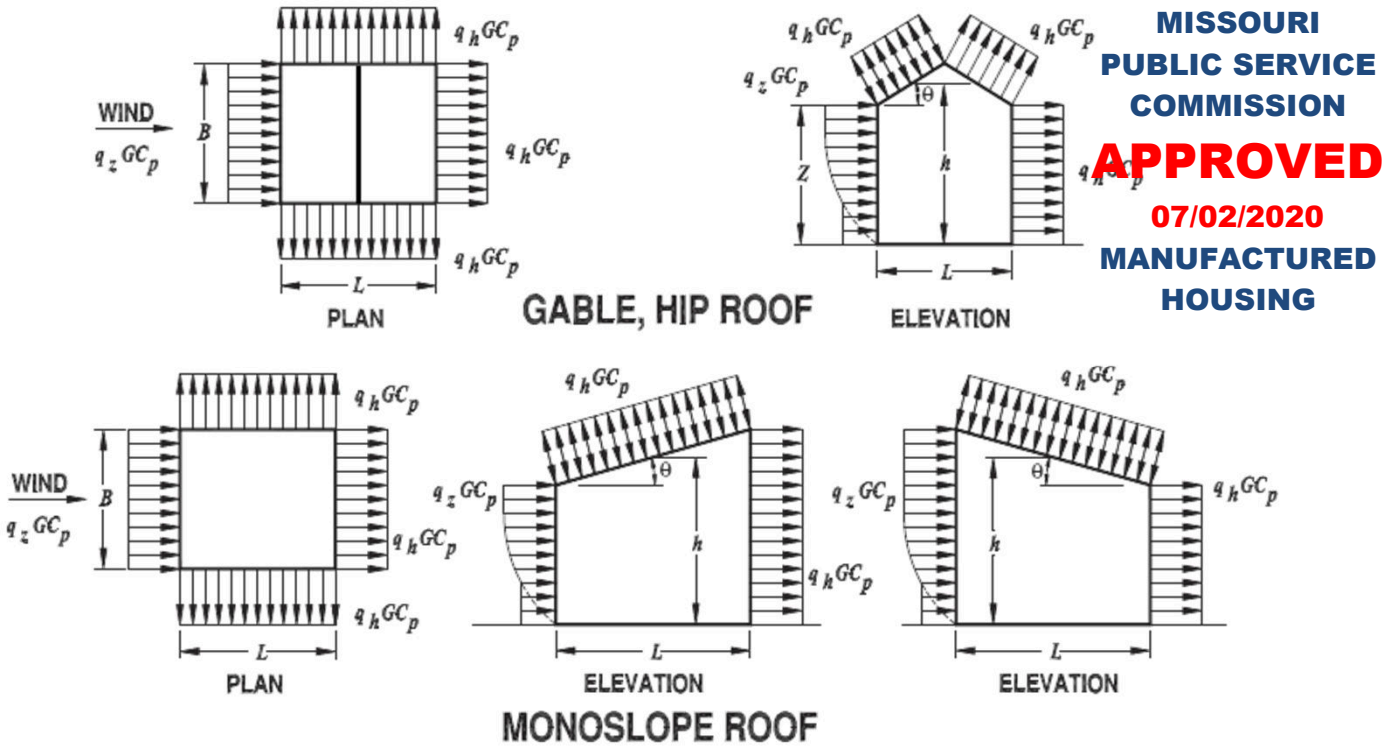
C. Design wind pressures for the MWFRS of buildings of all heights [Figure 27.3-1]

Design wind pressure $p = qGC_p - q_i(GC_{pi})$ (psf)

Wind pressure diagrams



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Plus and minus signs signify pressures acting toward and away from surfaces, respectively

Wind load cases

Case 1. Wind direction normal to ridge, external pressure windward roof at maximum suction and positive internal pressure.
Case 2. Wind direction normal to ridge, external pressure windward roof at minimum suction and positive internal pressure.
Case 3. Wind direction normal to ridge, external pressure windward roof at maximum suction and negative internal pressure.
Case 4. Wind direction normal to ridge, external pressure windward roof at minimum suction and negative internal pressure.
Case 5. Wind direction parallel to ridge, external pressure maximum suction and positive internal pressure.
Case 6. Wind direction parallel to ridge, external pressure minimum suction and positive internal pressure.
Case 7. Wind direction parallel to ridge, external pressure maximum suction and negative internal pressure.
Case 8. Wind direction parallel to ridge, external pressure minimum suction and negative internal pressure.

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SEISMIC LOAD *ID* *All Structure* [ASCE-7 2010. Section 12.8., page 89]

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Design load code	ASCE 7-10	ASCE 7-10		
Structure height from base to highest level	13.81	h_n = 13.81	ft	
Soil site classification	D	D		[Table 20.3-1, page 204]
Soil type		Stiff soil		
Risk Category	II	II		[Table 1.5-1, page 2]
Occupancy type		Standard occupancy structures		
Importance factor		I_e = 1.00		[Table 1.5-2, page 5]
Short period ground acceleration	0.114	S_s = 0.114	g	[Fig. 22-1, page 212]
1-second ground acceleration	0.067	S_1 = 0.067	g	[Fig. 22-2, page 214]
Short period site coefficient		F_a = 1.600		[Table 11.4-1, page 66]

	S_s	F_a
<	0.250	1.600
	0.114	1.709
.	0.500	1.400

$F_{a\ Interpolation}$ = 1.600

Long period site coefficient		F_v = 2.400		[Table 11.4-2, page 66]

	S_1	F_v
<	0.100	2.400
	0.067	2.532
.	0.200	2.000

$F_{v\ Interpolation}$ = 2.400

Adjusted Maximum Considered Earthquake (MCE) response accelerations [11.4.3, page 65]

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For short periods, $F_a S_s$	S_{MS} = 0.182	g	[Eq. (11.4-1)]
For 1-second period, $F_v S_1$	S_{M1} = 0.161	g	[Eq. (11.4-2)]

Design spectral accelerations [11.4.4]

For short periods, 2/3 S_{MS}	**S_{DS} = 0.122**	**g**	[Eq. (11.4-3)]
For 1-second period, 2/3 S_{M1}	S_{D1} = 0.107	g	[Eq. (11.4-4)]

Seismic Design Category (SDC) [11.6, page 67]

SDC based on S_{DS}	1 A	[Table 11.6-1]
SDC based on S_{D1}	2 B	[Table 11.6-2]
Check $S_1 \geq 0.75$, Risk Cat. I, II, III	0 (n.a.)	
Check $S_1 \geq 0.75$, Risk Cat. IV	0 (n.a.)	
Seismic Design Category	2 **B**	

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Period determination [12.8.2, page 90]

Long-period transition period		T_L =	6.00 sec	[Fig. 22-15, page 224]
Approximate fundamental period		T_a =	$C_t h_n^x$	
Maximum value of fundamental period		T_{max} =	$T_a C_u$	
Coefficient for upper limit on calculated period		C_u =	1.7 (For S_{D1} value see next page)	
Structure height from base to highest level		h_n =	13.81 ft	
Steel moment-resisting frames	$T_a = 0.028\ h_n^{0.8}$	T_a =	0.229 sec	T_{max} = 0.389 sec
Eccentrically braced steel frames	$T_a = 0.03\ h_n^{0.75}$	T_a =	0.215 sec	T_{max} = 0.365 sec
All other structural systems	$T_a = 0.02\ h_n^{0.75}$	T_a =	0.143 sec	T_{max} = 0.244 sec

	I. Transverse	II. Longitudinal
Structural type	All other structural systems	All other structural systems
Determine structure fundamental periods	T = 0.143 sec	T = 0.143 sec

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CHAPTER 12

Design coefficients and factors for seismic force-resisting systems [Table 12.2-1, page 73 to 77]

	I. Transverse	II. Longitudinal
	A. Bearing Wall Systems 15. Light-frame (wood) walls sheathed with wood structural panels rated for shear resistance	A. Bearing Wall Systems 15. Light-frame (wood) walls sheathed with wood structural panels rated for shear resistance
Response modification coefficient	R = 6.50	R = 6.50
System overstrength factor	Ω_0 = 3.00	Ω_0 = 3.00
Deflection amplification factor	C_D = 4.00	C_D = 4.00

Seismic response coefficients [12.8.1.1, page 89]

Structure seismic load directions	I. Transverse	II. Longitudinal
$C_s = \frac{S_{DS}}{\left(\frac{R}{I}\right)}$	C_S = 0.019 Govern!	C_S = 0.019 Govern!
For $T \le T_L$, $C_{s\,max} = \frac{S_{D1}}{T\left(\frac{R}{I}\right)}$	$C_{S\,max.}$ = 0.115	$C_{S\,max.}$ = 0.115
For $T > T_L$, $C_{s\,max} = \frac{S_{D1}T_L}{T^2\left(\frac{R}{I}\right)}$	$C_{S\,max.}$ = (n.a.)	$C_{S\,max.}$ = (n.a.)
$C_{s\,min} = 0.044\ S_{DS}\ I_e$	$C_{S\,min.}$ = 0.005	$C_{S\,min.}$ = 0.005
$C_{s\,min} = 0.01$	$C_{S\,min.}$ = 0.01	$C_{S\,min.}$ = 0.01
For $S_1 \ge 0.6$ g, $C_{s\,min} = \frac{0.5S_1}{\left(\frac{R}{I}\right)}$	$C_{S\,min.}$ = (n.a.)	$C_{S\,min.}$ = (n.a.)
Design seismic response coefficients	C_S = **0.019**	C_S = **0.019**

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Seismic base shear [Eq. (12.8-1), page 89]

$V = C_S\ W$

W = the effective seismic weight per Section 12.7.2.

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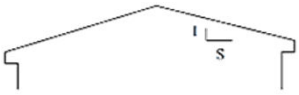
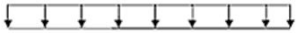
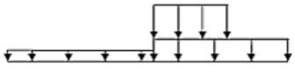
DESIGN LOAD SUMMARY

		[in o.c.]	[ft o.c.]
Typical frame spacing	Roof Rafter	24.0	2.00
	Wall frame	16.0	1.33
	Floor frame	16.0	1.33
	Ridge Beam	142.0	11.83

Load Types	Member ID	Design Loads			Frame spacing [in o.c.]	Frame spacing [ft o.c.]	Linear load	
Dead Load	Roof & Ceiling dead load	12.0	psf		24.0	2.00	24.0	plf
	Exterior wall dead load	12.0	psf		16.0	1.33	16.0	plf
	Interior wall dead load	6.0	psf		16.0	1.33	8.0	plf
	Floor dead load	12.0	psf		16.0	1.33	16.0	plf
Roof live load	Concentrated load	P_r = 300	lb					
	Roof Rafter	L_r = 20.0	psf		24.0	2.00	40.0	plf
	Ridge Beam	L_r = 12.0	psf		142.0	11.83	142.0	plf
Floor live load	Schools - Classrooms	L_L = 40.0	psf		16.0	1.33	53.3	plf
	Conc. load over 2.5' x 2.5'	P_L = 1000	lb					
Snow load	Flat roof snow	p_f = 13.9	psf		24.0	2.00	27.7	plf
	Non Reducible snow	p_s = n/a	psf				n/a	plf
	For Pitched Roof							
	Balanced snow	p_s = 20.0	psf				40.0	plf
	Unbalanced snow loads need to be considered							
W ≤ 20ft (Governs!)	Unbalanced snow	20.0	psf				40.0	plf
W > 20ft .	Unbalanced snow							
	Windward roof snow	6.0	psf				12.0	plf
	Leeward roof snow	20.0	psf				40.0	plf
	Leeward surcharge snow	8.8	psf				17.5	plf
	Leeward surcharge length	7.7	ft					

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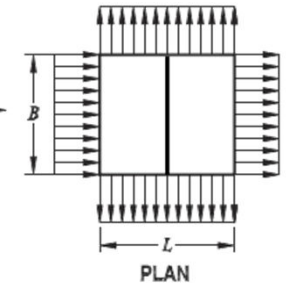
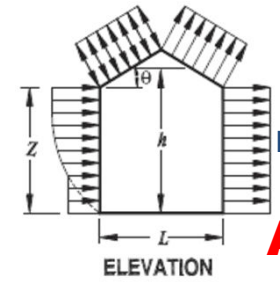
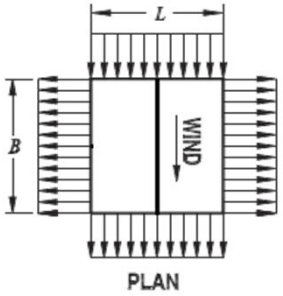
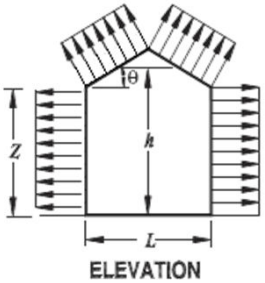
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

Load Types	Member ID	Design Loads		Frame spacing [in o.c.]	[ft o.c.]	Linear load	
Wind Load	**MWFRS For Pitched Roof**	(+ toward, - away from surface)		24.0	2.00		
Case 1	Windward wall at 0 - 15 ft	7.9	psf			15.8	plf
	Windward wall at eave	8.0	psf			15.9	plf
	Windward roof max. suction	-15.2	psf			-30.5	plf
	Leeward roof	-9.8	psf			-19.7	plf
	Leeward wall	-9.6	psf			-19.3	plf
	Side walls	-12.3	psf			-24.7	plf
Case 2	Windward wall at 0 - 15 ft	7.9	psf			15.8	plf
	Windward wall at eave	8.0	psf			15.9	plf
	Windward roof max. suction	-5.3	psf			-10.6	plf
	Leeward roof	-9.8	psf			-19.7	plf
	Leeward wall	-9.6	psf			-19.3	plf
	Side walls	-12.3	psf			-24.7	plf
Case 3	Windward wall at 0 - 15 ft	13.6	psf			27.2	plf
	Windward wall at eave	13.7	psf			27.4	plf
	Windward roof max. suction	-9.5	psf			-19.0	plf
	Leeward roof	-4.1	psf			-8.2	plf
	Leeward wall	-3.9	psf			-7.8	plf
	Side walls	-6.6	psf			-13.2	plf
Case 4	Windward wall at 0 - 15 ft	13.6	psf			27.2	plf
	Windward wall at eave	13.7	psf			27.4	plf
	Windward roof max. suction	0.4	psf			0.9	plf
	Leeward roof	-4.1	psf			-8.2	plf
	Leeward wall	-3.9	psf			-7.8	plf
	Side walls	-6.6	psf			-13.2	plf
Case 5	Roof	-14.8	psf			-29.7	plf
	Side walls	-12.3	psf			-24.7	plf
	Windward wall	8.0	psf			15.9	plf
	Leeward wall	-9.6	psf			-19.3	plf
Case 6	Roof	-5.3	psf			-10.6	plf
	Side walls	-12.3	psf			-24.7	plf
	Windward wall	8.0	psf			15.9	plf
	Leeward wall	-9.6	psf			-19.3	plf
Case 7	Roof	-9.1	psf			-18.2	plf
	Side walls	-6.6	psf			-13.2	plf
	Windward wall	13.7	psf			27.4	plf
	Leeward wall	-3.9	psf			-7.8	plf
Case 8	Roof	0.4	psf			0.9	plf
	Side walls	-6.6	psf			-13.2	plf
	Windward wall	13.7	psf			27.4	plf
	Leeward wall	-3.9	psf			-7.8	plf









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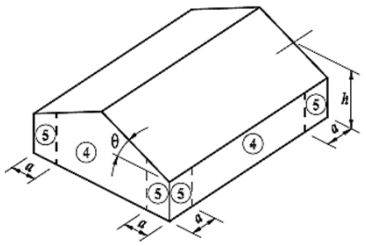
Company :	Modular Structural Consultants, LLC.	Project No :	2279-2280	MSC#	M20027
Engineer :	Yuri Yurianto, S.E., P.E., M.Sc.	Project Name :	Dry Classroom Building		
Address :	5760 Legacy Dr. B3-333. Plano, TX 75024	Location :	Classroom Lee's Summit MO		
Phone:	(972) 896-5373	Subject :	Modular 23.67'x64'		
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

Load Types	Member ID		Design Loads		Frame spacing [in o.c.]	Frame spacing [ft o.c.]	Linear load	
Wind Load	**Wall Components & Cladding** (+ toward, - away from surface)				16.0	1.33		
Case 1 (Outward)	Int. zone wall stud	Zone 4	-19.6	psf			-26.2	plf
	End zone wall stud	Zone 5	-23.1	psf			-30.8	plf
	Int. zone door jamb	Zone 4	-19.6	psf			-26.2	plf
	Int. zone wall panel	Zone 4	-21.2	psf			-28.2	plf
	End zone wall panel	Zone 5	-26.1	psf			-34.8	plf
Case 2 (Inward)	Int. zone wall stud	Zone 4	18.0	psf			24.0	plf
	End zone wall stud	Zone 5	18.0	psf			24.0	plf
	Int. zone door jamb	Zone 4	18.0	psf			24.0	plf
	Int. zone wall panel	Zone 4	19.5	psf			26.0	plf
	End zone wall panel	Zone 5	19.5	psf			26.0	plf
Minimum			16.0	psf			21.3	plf



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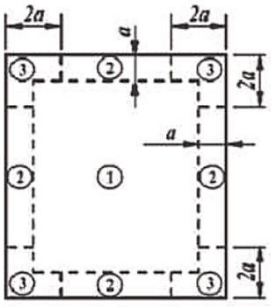
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

Load Types	Member ID		Design Loads		Frame spacing [in o.c.]	[ft o.c.]	Linear load	
Wind Load	**Roof Components & Cladding**(+ toward, - away from surface)				24.0	2.00		
Case 1	Member zone 1	Zone 1	-26.5	psf			-52.9	plf
	Member zone 2	Zone 2	-35.0	psf			-70.1	plf
	Roof panel zone 1	Zone 1	-31.1	psf			-62.2	plf
	Roof panel zone 2	Zone 2	-41.0	psf			-82.0	plf
	Roof panel zone 3	Zone 3	-55.9	psf			-111.8	plf
Case 2	Member zone 1	Zone 1	-20.5	psf			-41.0	plf
	Member zone 2	Zone 2	-29.1	psf			-58.2	plf
	Roof panel zone 1	Zone 1	-25.1	psf			-50.3	plf
	Roof panel zone 2	Zone 2	-35.1	psf			-70.1	plf
	Roof panel zone 3	Zone 3	-49.9	psf			-99.9	plf
Minimum			16.0	psf			21.3	plf



ROOF PLAN

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Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

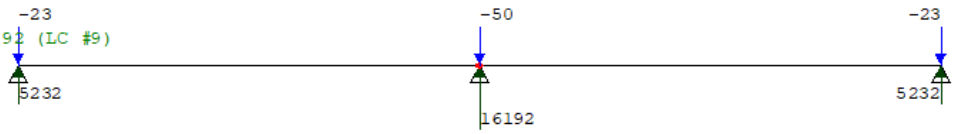
APA All-Plywood Beam *Member ID :* **Ridge Beam**

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Wdead	Dead	Full Area	No			12.00(11.83')		psf
Wsnow	Snow	Full Area	Yes			20.00(11.83')		psf
Wwind MWFRS	Wind	Full Area	No			-14.80(11.83')		psf
Wrooflive	Roof live	Full Area	Yes			12.00(11.83')		psf
Self-weight	Dead	Full UDL	No			31.0		plf

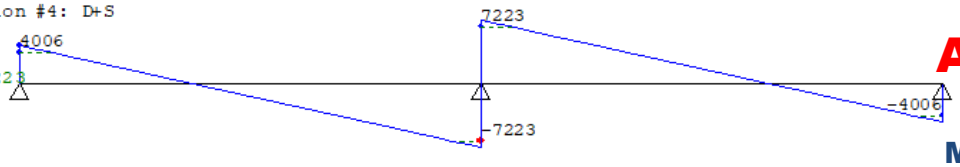
Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :

Unfactored:					
Dead	2104		6838		2104
Snow	3128		9354		3128
Wind	-2142		-6922		-2142
Roof Live	2017		5612		2017
Factored:					
Uplift	-23		-50		-23
Total	5232		16192		5232

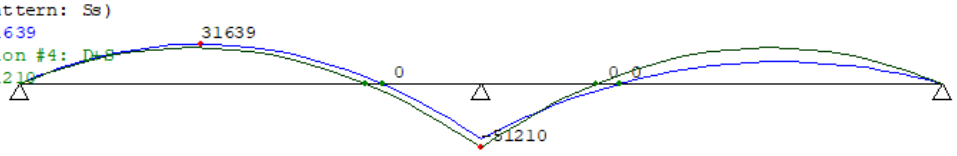
REACTION [lbs] ANALYSIS DIAGRAMS (known section - includes self-weight)
Maximum...
Bearing: 16192 (LC #9)



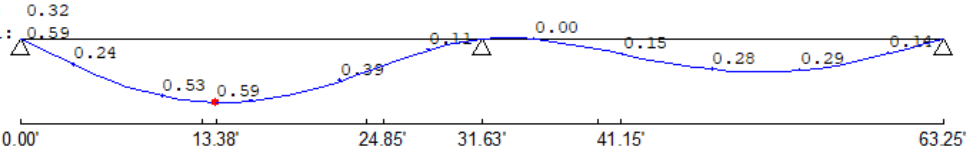
SHEAR [lbs]
Load Combination #4: D+S
V design: -7223



BENDING [lbs-ft]
LC #8: D+S (pattern: Ss)
+M max: 31639
Load Combination #4: D+S
-M max: -51210



TOTAL DEFLECTION [in]
Load Combination #8:
Total = 1.50 x Dead + Live (all others)
Critical Live: 0.32
Critical Total: 0.59



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APA - All Plywood Beam *Member ID :* **Ridge Beam**

References: ***APA Plywood Design Specification, January 1997 [PDS].***
APA Plywood Design Specification Supplement 5, Design and Fabrication of All-Plywood Beams, November 2008 [PDS-S5].

1. Material and Section Properties

[PDS-S5, Table 1, pg. 5]

Plywood species group	All plies Group 1 (including Structural I)	
Plywood grade	APA STRUCTURAL I RATED SHEATING EXP 1	
Nominal plywood thickness	23/32 or 3/4	in, per plywood panel
No. of plies / No. of layers 23/32 or 3/4-5/5	5/5	per plywood panel

Check at Section of interest	*For bending stress & deflection*				*For shear stress*		
	Middle span		*Interior support*				
Beam total number of panels	n_b =	8	8		n_b =	8	
Number of panels at critical section	(n) =	6	6		(n) =	6	
Beam section height	d =	24.00 in	24.00 in		d =	24.00	in
Plywood gross thickness per panel	t_g =	0.75 in	0.75 in				
Beam gross width, (n) t_g	b_g =	**4.500** in	**4.500** in				
Plywood effective thickness per panel	t_b =	0.352 in	0.352 in		t_s =	0.739	in
Beam effective width, (n) $t_{b,s}$	b =	2.112 in	2.112 in		b =	4.434	in
Section area, bd	A =	50.69 in^2	50.69 in^2		A =	106.42	in^2
Section modulus about x-x axis, $bd^2/6$	S_{xx} =	202.8 in^3	202.8 in^3		S_{xx} =	425.7	in^3
Moment of inertia about x-x axis, $bd^3/12$	I_{xx} =	2433.0 in^4	2433.0 in^4		I_{xx} =	5108.0	in^4
Hole diameter	d_h =	0.00 in	0.00 in		d_h =	0.00	in
Hole Section area, bd_h	$A_{(h)}$ =	0.00 in^2	0.00 in^2		$A_{(h)}$ =	0.00	in^2
Hole Section modulus about x-x axis, $bd_h^2/6$	$S_{xx(h)}$ =	0.0 in^3	0.0 in^3		$S_{xx(h)}$ =	0.0	in^3
Hole Moment of inertia about x-x axis, $bd_h^3/12$	$I_{xx(h)}$ =	0.0 in^4	0.0 in^4		$I_{xx(h)}$ =	0.0	in^4

2. Design Parameters

[PDS, pg. 18]

Middle span bending Design Load (for C_D)	Snow Load / Roof Live Load	
Interior support bending Design Load (for C_D)	Snow Load / Roof Live Load	
Shear Design Load (for C_D)	Snow Load / Roof Live Load	
In-service moisture conditions	Dry	(M.C. ≤ 16 %)
Unbraced length at middle span (for C_L)	Case1 ℓ_u = 24	in
Unbraced length at interior support (for C_L)	Case2 ℓ_u = 48	in

3. Reference Design Values

[PDS-S5, 1.5, pg.6; PDS, Table 3, pg.16]

Reference bending design value	F_b =	3300	psi	
Reference shear design value	F_v =	225	psi	
Reference modulus of elasticity	E =	1800000	psi	(For deflection calculation)
Reference modulus of elasticity, ± 36% E	E_{min} =	660000	psi	(For beam stability calculations)
Reference modulus of rigidity (shear modulus)	G =	90000	psi	

4. Adjustment Factors

Load duration factor	C_D = 1.15		(For middle span bending)
	C_D = 1.15		(For interior support bending)
	C_D = 1.15		(For shear check)
Beam stability factor	C_L = 0.981		(For middle span bending)
	C_L = 0.973		(For interior support bending)

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Address :	5760 Legacy Dr. B3-333. Plano, TX 75024	Location :	Classroom Lee's Summit MO
Phone:	(972) 896-5373	Subject :	Modular 23.67'x64'
Email:	yurianto@modularconsultant.com	Date:	6/11/2020 Final

Calculation of beam stability factor, C_L [NDS 2005, 3.3.3, pg. 13 & Breyer 6th ed, pg. 6.19]

	Case 1		Case 2	
Case descriptions	Middle Span Bending		Interior Support Bending	
Type of Load	Uniformly distributed load		Uniformly distributed load	
Beam unbraced length	ℓ_u = 24	in	ℓ_u = 48	in
	ℓ_u / d = 1.0	< 7	ℓ_u / d = 2.0	< 7
	ℓ_e = 2.06 lu		ℓ_e = 1.33 lu	
Bending member effective length	ℓ_e = 49	in	ℓ_e = 64	in
Slenderness ratio $R_B = \sqrt{l_e d / b^2}$	R_B = 7.7	.	R_B = 8.7	.
Modulus of elasticity	E_{min} = 660000	psi	E_{min} = 660000	psi
$F_{bE} = \frac{1.20 E_{min}}{R_B^2}$	F_{bE} = 13516	psi	F_{bE} = 10468	psi
$F_b^* = F_b C_D$	F_b^* = 3795	psi	F_b^* = 3795	psi
$C_L = \frac{1+(F_{bE}/F_b^*)}{1.9} - \sqrt{\left(\frac{1+(F_{bE}/F_b^*)}{1.9}\right)^2 - \frac{(F_{bE}/F_b^*)}{0.95}}$	C_L = 0.981	< 1.00	C_L = 0.973	< 1.00
Beam stability factor	C_L = 0.981		C_L = 0.973	

5. Adjusted Design Values

Adjusted bending design values $F_{bx}' = F_b C_D C_L$

Case 1: F_{bx}' = 3724 psi Middle Span Bending

Case 2: F_{bx}' = 3694 psi Interior Support Bending

Adjusted shear design value $F_v' = F_v C_D$

F_v' = 259 psi

Adjusted modulus of elasticity $E' = E * 1.1$

E' = 1980000 psi (For deflection calculations)

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6. Beam Loadings .

(Enter positive values)

Applied Bending at Middle Span	M_{x+} = 31639	lb-ft	= 379668 lb-in
Applied Bending at Interior Support	M_{x-} = 51210	lb-ft	= 614520 lb-in
Applied Shear	V = 7223	lbs	

7. Design Code Checks

	Case 1		Case 2	
i. Bending	Middle Span Bending		Interior Support Bending	
	$f_{bx} \le F_{bx}'$		**$f_{bx} \le F_{bx}'$**	
	$f_{bx} = M_{x+} / (S_{xx} - S_{xx(h)})$		$f_{bx} = M_{x-} / (S_{xx} - S_{xx(h)})$	
Actual bending stress	f_{bx} = 1873	psi	f_{bx} = 3031	psi
Adjusted bending design values	F_{bx}' = 3724	psi	F_{bx}' = 3694	psi
Bending capacity ratio, (f_{bx} / F_{bx}')	**0.503**	**< 1.0. O.K.**	**0.820**	**< 1.0. O.K.**
ii. Shear	**$f_v \le F_v'$**			
	$f_v = (3/2) V / (b (d - d_h))$			
Actual shear stress	f_v = 102	psi		
Adjusted shear design value	F_v' = 259	psi		
Shear capacity ratio, (f_v / F_v')	**0.393**	**< 1.0. O.K.**		

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WoodWorks

ROOF RAFTER

Lumber-soft, S. Pine, No.2, 2x10 (1-1/2"x9-1/4")

Supports: 1 - Lumber Stud Wall, S. Pine No.2; 2 - Hanger;
Roof joist spaced at 24.0" c/c; Total length: 12.39'; Clear span: 11.656'; Volume = 1.2 cu.ft.; Pitch: 2.25/12
Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help);

This section PASSES the design code check.

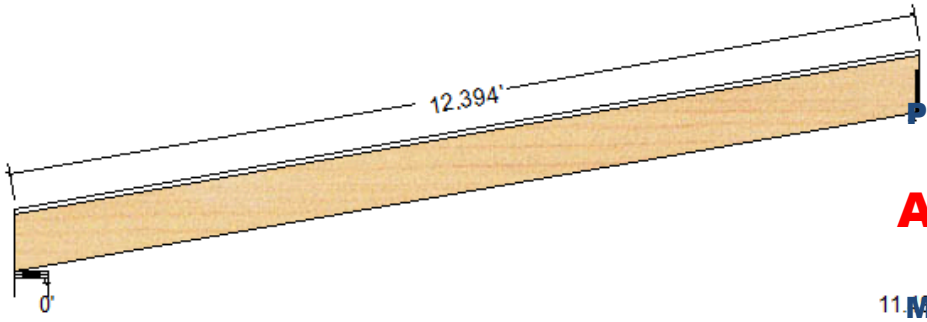
Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 36	Fv' = 175	psi	fv/Fv' = 0.21
Bending(+)	fb = 631	Fb' = 920	psi	fb/Fb' = 0.69
Bending(-)	fb = 135	Fb' = 559	psi	fb/Fb' = 0.24
Live Defl'n	0.12 = < L/999	0.58 = L/240	in	0.20
Total Defl'n	0.24 = L/581	0.78 = L/180	in	0.31

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Wdead	Dead	Full Area				12.00(24.0")		psf
Wsnow	Snow	Full Area				20.00(24.0")		psf
Wwind C&C	Wind C&C	Full Area				-26.50(24.0")		psf
Wrooflive	Roof live	Full Area				20.00(24.0")		psf
Self-weight	Dead	Full UDL				3.6		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	172		164
Snow	247		234
Wind	-328		-310
Roof Live	247		234
Factored:			
Uplift	-94		-88
Total	419		398

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EXTERIOR 6IN WALL

Lumber Stud, S. Pine, No.2, 2x6 (1-1/2"x5-1/2")

Support: Lumber Stud Bottom plate, S. Pine No.2; Bearing length = stud thickness; continuous lower support
Spaced at 16.0" c/c; Total length: 8.15'; Volume = 0.5 cu.ft.
Pinned base; Load face = width(b); Ke x Lb: 1.0 x 0.0 = 0.0 ft; Ke x Ld: 1.0 x 8.15 = 8.15 ft; Repetitive factor: applied where permitted (refer to online help);
This section PASSES the design code check.

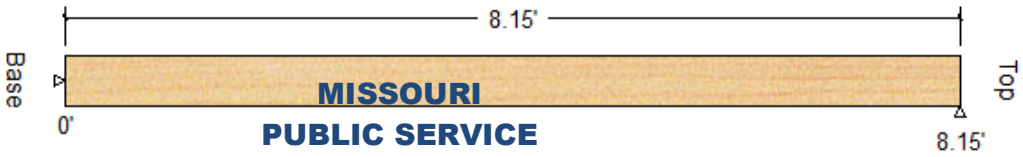
Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 12	Fv' = 280	psi	fv/Fv' = 0.04
Bending(+)	fb = 214	Fb' = 2159	psi	fb/Fb' = 0.10
Axial	fc = 36	Fc' = 941	psi	fc/Fc' = 0.04
Combined	(axial + eccentric + side load bending)			Eq.15.4-1 = 0.10
Axial Bearing	fc = 36	Fc* = 1400	psi	fc/Fc* = 0.03
Support Bearin	fcp = 36	Fcp = 565	psi	fcp/Fcp = 0.06
Live Defl'n	0.04 = < L/999	0.81 = L/120	in	0.05
Total Defl'n	0.04 = < L/999	0.81 = L/120	in	0.05

Loads:

Load	Type	Distribution	Location [ft] Start	End	Magnitude Start	End	Unit
Pdead	Dead	Axial UDL	(Ecc. = 0.92")		86		plf
Psnow	Snow	Axial UDL	(Ecc. = 0.92")		124		plf
Wwind C&C	Wind C&C	Full Area			19.60(16.0")		psf
Prooflive	Roof live	Axial UDL	(Ecc. = 0.92")		124		plf
Self-weight	Dead	Axial UDL			13		plf

Reactions (lbs):



Unfactored:			
Lateral:			
Dead	1		-1
Snow	2		-2
Wind	106		106
Roof Live	2		-2
Axial:			
Dead	132		132
Snow	165		165
Roof Live	165		165

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Engineer :	Yuri Yurianto, S.E., P.E., M.Sc.	Project Name :	Dry Classroom Building		
Address :	5760 Legacy Dr. B3-333. Plano, TX 75024	Location :	Classroom Lee's Summit MO		
Phone:	(972) 896-5373	Subject :	Modular 23.67'x64'		
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

STUD PACK 6IN WALL - HALF MATE

Lumber n-ply, S. Pine, No.2, 2x6, 3-ply (4-1/2"x5-1/2")

Support: Non-wood

Total length: 9.0'; Volume = 1.5 cu.ft.

Pinned base; Load face = width(b); Built-up fastener: bolts; Ke x Lb: 1.0 x 0.0 = 0.0 ft; Ke x Ld: 1.0 x 9.0 = 9.0 ft; Repetitive factor: applied where permitted (refer to online help);

This section PASSES the design code check.

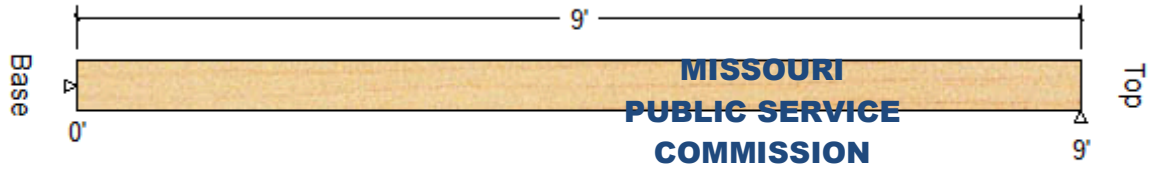
Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 4	Fv' = 201	psi	fv/Fv' = 0.02
Bending(+)	fb = 328	Fb' = 1322	psi	fb/Fb' = 0.25
Axial	fc = 329	Fc' = 877	psi	fc/Fc' = 0.38
Combined	(axial + eccentric moment)			Eq.15.4-3 = 0.52
Axial Bearing	fc = 329	Fc* = 1610	psi	fc/Fc* = 0.20
Live Defl'n	0.04 = < L/999	0.90 = L/120	in	0.04
Total Defl'n	0.08 = < L/999	0.90 = L/120	in	0.09

Loads:

Load	Type	Distribution	Location [ft] Start	End	Magnitude Start	End	Unit
Pdead	Dead	Axial	(Ecc. = 0.92")		3419		lbs
Psnow	Snow	Axial	(Ecc. = 0.92")		4677		lbs
Pwind	Wind	Axial	(Ecc. = 0.92")		-3461		lbs
Prooflive	Roof live	Axial	(Ecc. = 0.92")		2806		lbs
Self-weight	Dead	Axial			58		lbs

Reactions (lbs):



Unfactored:			
Lateral:			
Dead	29		-29
Snow	40		-40
Wind	-29		29
Roof Live	24		-24
Axial:			
Dead	3477		3477
Snow	4677		4677
Wind	-3461		-3461
Roof Live	2806		2806

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FLOOR JOIST

Lumber-soft, S. Pine, No.2, 2x8 (1-1/2"x7-1/4")

Supports: All - Non-wood

Floor joist spaced at 16.0" c/c; Total length: 11.83'; Clear span: 1.603', 7.957', 1.603'; Volume = 0.9 cu.ft.

Lateral support: top = continuous, bottom = at supports; Repetitive factor: applied where permitted (refer to online help);

This section PASSES the design code check.

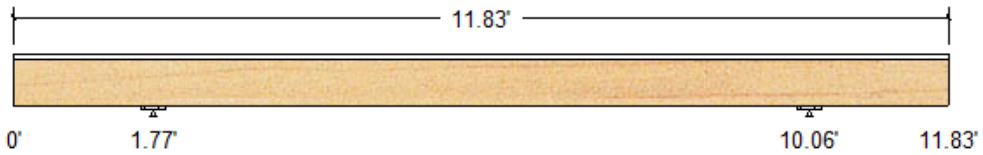
Analysis vs. Allowable Stress and Deflection using NDS 2018 :

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	fv = 65	Fv' = 175	psi	fv/Fv' = 0.37
Bending(+)	fb = 887	Fb' = 1063	psi	fb/Fb' = 0.83
Bending(-)	fb = 611	Fb' = 901	psi	fb/Fb' = 0.68
Deflection:				
Interior Live	0.16 = L/633	0.28 = L/360	in	0.57
Total	0.16 = L/630	0.41 = L/240	in	0.38
Cantil. Live	-0.10 = L/205	0.12 = L/180	in	0.88
Total	-0.10 = L/222	0.18 = L/120	in	0.54

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Floor dead	Dead	Full Area	No			12.00(16.0")		psf
Floor live	Live	Full Area	No			40.00(16.0")		psf
Concentrated	Live	Concentrated	No	At Increments		1000(30.0")		lbs
Pdead	Dead	Point	No	0.25		132		lbs
Psnow	Snow	Point	No	0.25		165		lbs
Prooflive	Roof live	Point	No	0.25		165		lbs
Self-weight	Dead	Full UDL	No			2.8		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:								
Dead			268			87		
Live			315			315		
Snow			195			-30		
Roof Live			195			-30		
Conc Live			567			567		
Factored:								
Total			839			654		

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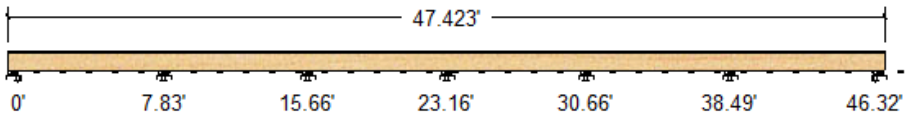
FRAME RAIL

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Wdead	Dead	Full UDL	No			201.0		plf
Wlive	Live	Full UDL	Yes			236.0		plf
Wsnow	Snow	Full UDL	Yes			146.0		plf
Wrooflive	Roof live	Full UDL	Yes			571.0		plf
Self-weight	Dead	Full UDL	No			13.1		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:												
Dead	770		1910		1579		1620		1579		1910		770
Live	954		2247		2106		2127		2106		2247		954
Snow	560		1346		1190		1210		1190		1346		560
Roof Live	2307		5437		5095		5145		5095		5437		2307
Factored:													
Total	3216		7673		6979		7074		6979		7673		3216

GEOMETRY

Beam Designation	M12X11.8		
Steel Yield Strength Fy	50.0	ksi	✓
Modulus of Elasticity Es ..	29000	ksi	
Member Length L	7.83	ft	
Left Cantilever	0.00	ft	
Right Cantilever	0.00	ft	
Unbraced Length Lb top	0.00	ft	
Unbraced Length Lb bot	7.83	ft	

DEFLECTIONS

Stiffness factor	1.0				
Required Camber	0.00	in			
Long-term Deflection	N.A.				
Loading	δ (in)	L/δ	L/δ Min	Ratio	
CL	0.01	9396	360	0.04	✓
CD+CL .	0.01	9396	240	0.03	✓
L	0.00	9396	360	0.04	✓
D+L	0.01	9396	240	0.03	✓

DEFLECTION DESIGN IS OK

DESIGN FOR SHEAR

Shear Coefficient Cv	0.93		
Maximum Shear Force V	2.4	kip	
Allowable Strength Vn/Ω	35.3	kip	
V / Vn/Ω Design Ratio	0.07		✓

SHEAR DESIGN IS OK

SLAB AND DECK

Overall Slab Thickness	0.0	in	
Concrete Strength f'c	3000	psi	
Metal Deck Type	None		

FLEXURE DESIGN (NON-COMPOSITE)

L. T. Buckling Cb-factor	2.08		
Max. Bending Moment M	-3.8	k-ft	
Allowable Strength Mn/Ω	26.1	k-ft	
M / Mn/Ω Design Ratio	0.15		✓
Limit State	Lateral Torsional Buckling		

FLEXURE DESIGN IS OK

FLEXURE DESIGN (COMPOSITE)

Shear Stud Length	N.A	
Reqd. # of 3/4" Shear Connectors	N.A	
% of Full Composite Action	N.A	
Max. Bending Moment M	N.A	
Allowable Strength Mn/Ω	N.A	
M / Mn/Ω Design Ratio	N.A	

DESIGN CODES

Steel Design	AISC 360-10 (14th Ed.)
Load Combinations ...	ASCE 7-10

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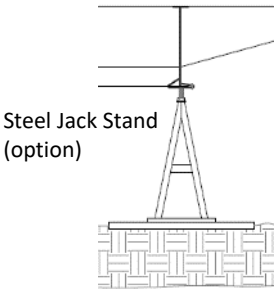
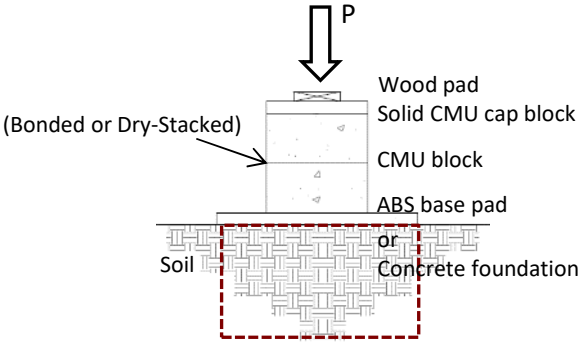
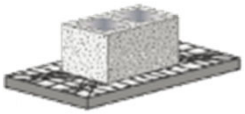
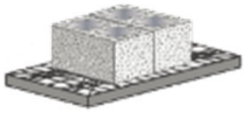
Foundations *[Pier ID] :* Modular building foundations






Single stack course


Double stack course

1. Material and Section Properties

Type of Foundations

Option 1. Dry-Stacked Without Mortar Joint P_a = 8.00 kips / stack [Rated 8000 lbs per single]

Number of stack course	1	Single Stack Course		
Single wythe width		b_1 =	8	in
Single wythe length		d_1 =	16	in

Option 2. CMU Bonded with Mortar Joint

CMU cell grout		No grout		
Net area of CMU block	55.3	A_n =	55.3	in^2
Compressive strength		f'_m =	1,350	psi
CMU allowable load, 1/4 f'_m A_n		P_a =	18.68	kips / stack

Option 3. Standard Jack Stand P_a = 6.00 kips / stand

Option 4. "Support Master" Jack Stand P_a = 18.00 kips / stand

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2. Foundation Loading & Design Checks

→	Location		Typical	8.00	ft on center spacing		
	Applied Load		P =	7.67	kips		
	Select Type of Foundation	2		CMU Dry-Stacked			
	Allowable Load			8.00	kips / stack		
	Quantity			1	stacks (or stands)		
	Total Allowable Load		$P_{a\ CMU}$ =	8.00	kips		
	Capacity ratio		(P / P_a) =	**0.959**	< 1.0		
	Design check			**O.K.**			
	Base Type			ABS Base Pad			
	Base Shape			Rectangular			
	Width (or Diameter)		b_2 =	24.0	in		
	Length	24	d_2 =	24.0	in		
	Quantity			1			
	Area		A_b =	576	in^2 =	4.00	ft^2
	Allowable soil bearing capacity		q_a =	2,000	psf		
	Soil allowable load, $q_a A_b$		$P_{a\ Soil}$ =	8.00	kips		
	Soil capacity ratio		(P / P_a) =	**0.959**	< 1.0		
	Design check			**O.K.**			

→	Location			Interior Stud Pack / Column			
	Applied Load		P =	16.00	kips		
	Select Type of Foundation	2		CMU Dry-Stacked			
	Allowable Load			8.00	kips / stack		
	Quantity			2	stacks (or stands)		
	Total Allowable Load		$P_{a\ CMU}$ =	16.00	kips		
	Capacity ratio		(P / P_a) =	**1.000**	< 1.0		
	Design check			**O.K.**			
	Base Type			ABS Base Pad			
	Base Shape			Rectangular			
	Width (or Diameter)		b_2 =	24.0	in		
	Length	24	d_2 =	24.0	in		
	Quantity			2			
	Area		A_b =	1,152	in^2 =	8.00	ft^2
	Allowable soil bearing capacity		q_a =	2,000	psf		
	Soil allowable load, $q_a A_b$		$P_{a\ Soil}$ =	16.00	kips		
	Soil capacity ratio		(P / P_a) =	**1.000**	< 1.0		
	Design check			**O.K.**			

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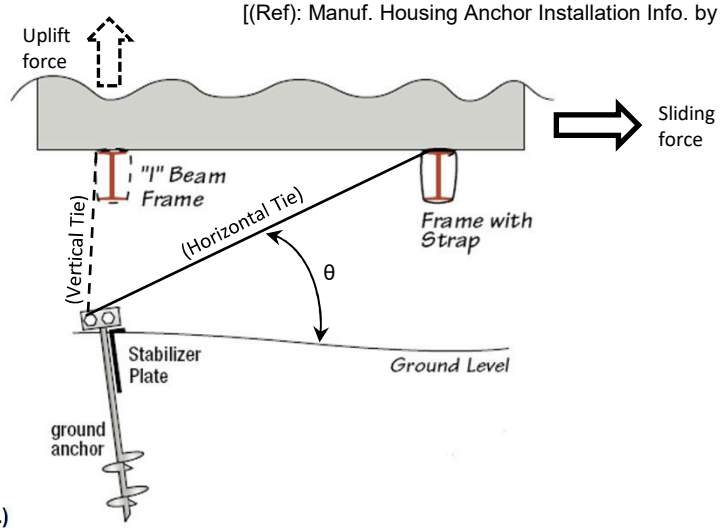
TIE DOWN ANCHOR

[(Ref): Manuf. Housing Anchor Installation Info. by Tie Down Engineering]



1. Anchoring Allowable Working Load Limit (WLL)

Tie Anchor WLL	3150	T_{WLL} =	3150	lbs	[Ref (above)]
Horizontal Tie Angle		θ =	**45.0**	degrees .	
Horizontal Resistant, T_{WLL} Cos θ		H_{WLL} =	2227	lbs	
Minimum tie anchor spacing		s =	6.00	ft	

2. Building Forces

A. Transverse direction				
Total Sliding force		$H_{A\ trans}$ =	**3690**	lbs
Total Uplift force		$V_{A\ trans}$ =	**0**	lbs
B. Longitudinal direction				
Total Sliding force		$H_{A\ longt}$ =	**1334**	lbs
Total Uplift force		$V_{A\ longt}$ =	**0**	lbs

3. Building Frame Tie Down

A. Transverse direction		B =	**64.00**	ft			
1) Number of horizontal ties	4	$N_{horz\ tie}$ =	4		B / N =	16.00	ft o.c.
Sliding force, $H_{A\ trans}$ / $N_{horz\ tie}$		$H_{1\ trans}$ =	922.5	lbs / tie			
Horz. tie capacity ratio		$H_{1\ trans}$ / H_{WLL} =	**0.414**	**< 1.00. O.K.**			
2) Number of vertical ties	0	$N_{vert\ tie}$ =	0	No vertical tie is required!			
Uplift force, $V_{A\ trans}$ / $N_{vert\ tie}$		$V_{1\ trans}$ =	0	lbs / tie			
Vert. tie capacity ratio		$V_{1\ trans}$ / T_{WLL} =	**0.000**	**< 1.00. O.K.**			
B. Longitudinal direction		L =	**23.67**	ft			
1) Number of horizontal ties	2	$N_{horz\ tie}$ =	2		L / N =	11.84	ft o.c.
Sliding force, $H_{A\ trans}$ / $N_{horz\ tie}$		$H_{1\ longt}$ =	667	lbs / tie			
Horz. tie capacity ratio		$H_{1\ longt}$ / H_{WLL} =	**0.299**	**< 1.00. O.K.**			
2) Number of vertical ties	0	$N_{vert\ tie}$ =	0	No vertical tie is required!			
Uplift force, $V_{A\ trans}$ / $N_{vert\ tie}$		$V_{1\ longt}$ =	0	lbs / tie			
Vert. tie capacity ratio		$V_{1\ longt}$ / T_{WLL} =	**0.000**	**< 1.00. O.K.**			

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CONNECTORS, STRAPS AND TIES

→ *Member ID :*		**Rafter - Bearing support**			
Connector Type		2x4 Ledger Fasten to Ridge Beam with 16d Nails at each Rafter			
Connector Capacity	$Z' = Z\ C_D\ C_M\ C_t\ C_g$				[NDS Table 11.3.1]
Ref. Design Value	$Z =$	154	lb	(G = 0.55)	[NDS Table 12N]
Load duration factor	$C_D =$	1.15			
Wet Service factor	$C_M =$	1.00			
Temperature factor	$C_t =$	1.00			
Group action factor	$C_g =$	1.00			
Connector Capacity	$Z' =$	177	lb		
Number of Nail		3	nails		
Bearing Capacity	$P_{allow} =$	531	lb		
Applied bearing force	$P_{applied} =$	419	lb		
Capacity ratio	$P_{applied} / P_{allow} =$	**0.79**	**< 1.00. O.K.**		

→ *Member ID :*		**Rafter - Uplift tiedown**			
Connector Type		1.5" metal strap, 30 gage, 51 ksi with 16ga staples			
Strap tensile strength	$F_y =$	51	ksi		
Strap thickness	$t_s =$	0.0157	inches		
Strap width	$b_s =$	1.50	inches		
Strap capacity	$P_{strap} =$	(0.9) 0.6 $F_y\ t_s\ b_s$		(w 10% reduction for staple holes)	
	$P_{strap} =$	649	lbs		
Staple shear resistant	$V_{staple} =$	68	lbs per staple		
Number of staple	$n_{staple} =$	6	staples at each end of strap		
Load duration factor	$C_D =$	1.60			
Staple capacity	$P_{staple} =$	$V_{staple}\ n_{staple}\ C_D$			
	$P_{staple} =$	653	lbs per strap		
Uplift Capacity		649	lbs / strap		
Number of straps		1	strap(s)		
Allowable uplift force	$P_{allow} =$	649	lbs		
Applied uplift force	$P_{applied} =$	94	lbs / rafter		
Stud spacing		16	inches o.c.		
Strap spacing		48	inches o.c.		
Applied uplift force	$P_{applied} =$	282	lbs / strap		
Capacity ratio	$P_{applied} / P_{allow} =$	**0.43**	**< 1.00. O.K.**		

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Company :	Modular Structural Consultants, LLC.	Project No :	2279-2280	MSC#	M20027
Engineer :	Yuri Yurianto, S.E., P.E., M.Sc.	Project Name :	Dry Classroom Building		
Address :	5760 Legacy Dr. B3-333. Plano, TX 75024	Location :	Classroom Lee's Summit MO		
Phone:	(972) 896-5373	Subject :	Modular 23.67'x64'		
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final	

→ *Member ID :* **Shear wall tie-down**

Connector Type		3.0" metal strap, 26 gage, 51 ksi with 10d (0.148") nails		
Strap tensile strength	F_y =	51	ksi	
Strap thickness	t_s =	0.0179	inches	
Strap width	b_s =	3.00	inches	
Strap capacity	P_{strap} =	(0.90) 0.6 F_y t_s b_s	(w 10% reduction for staple holes)	
	P_{strap} =	1479	lbs	
Nail shear resistant	V_{nail} =	123	lbs per nail	
Number of nails	n_{nail} =	8	nails at ea. end of strap w 1" spc. staggered	
Load duration factor	C_D =	1.60		
Nail capacity	P_{nail} =	V_{nail} n_{nail} C_D		
	P_{nail} =	1574	lbs per strap	
Uplift Capacity		1,479	lbs / strap	
Number of straps		1	strap(s)	
Allowable uplift force	P_{allow} =	1,479	lbs	
Applied uplift force	$P_{applied}$ =	1,281	lbs	.
Capacity ratio	$P_{applied}$ / P_{allow} =	**0.87**	**< 1.00. O.K.**	

→ *Member ID :* **Frame Outrigger to Floor Framing**

Connector Type		5/16" x 3-1/2" lag screws		
Connector Capacity	W' =	W C_D C_M C_t		[NDS Table 11.3.1]
Ref. Design Value	W =	307	lb / in (G = 0.55)	[NDS Table 12.2A]
Effective Thread Length	T-E =	2.0	in	[NDS Table L2]
Design Load Type		Wind/Earthquake Load		
Load duration factor	C_D =	1.60		
Wet Service factor	C_M =	1.00		
Temperature factor	C_t =	1.00		
Connector Uplift Capacity	W' =	982	lbs / lag screw	
Number of straps		2	lag screw(s)	
Allowable uplift force	P_{allow} =	1,965	lb	
Applied uplift force	$P_{applied}$ =	94	lbs / stud	
Stud spacing		16	inches o.c.	
Lag Screw spacing		96	inches o.c.	
Applied uplift force	$P_{applied}$ =	564	lbs / stud	
Capacity ratio	$P_{applied}$ / P_{allow} =	**0.29**	**< 1.00. O.K.**	

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SHEAR WALLS

WoodWorks® Shearwalls — SOFTWARE FOR WOOD DESIGN

WoodWorks® Shearwalls 2019 (Update 1)

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Project Information

DESIGN SETTINGS

Design Code	Wind Standard	Seismic Standard
IBC 2018/AWC SDPWS 2015	ASCE 7-16 Directional (All heights)	ASCE 7-16

Load Combinations		Building Code Capacity Modification	
For Design (ASD)	For Deflection (Strength)	Wind	Seismic
0.70 Seismic	1.00 Seismic	1.00	1.00
0.60 Wind	1.00 Wind		

Service Conditions and Load Duration				Max Shearwall Offset [ft]	
Duration Factor	Temperature Range	Moisture Content Fabrication	Service	Plan (within story)	Elevation (between stories)
1.60	T<=100F	19% (<=19%)	19% (<=19%)	0.50	-

Maximum Height-to-width Ratio					
Wood panels		Fiberboard	Lumber		Gypsum
Wind	Seismic		Wind	Seismic	Blocked	Unblocked
3.5	3.5	-	-	-	2.0	1.5

Ignore non-wood-panel shear resistance contribution...		Forces based on...	
Wind	Seismic	Hold-downs	Applied loads
when comb'd w/ wood panels	Always	Drag struts	Applied loads

Shearwall relative rigidity:	Deflection-based stiffness of wall segments
Perforated shearwall Co factor:	SDPWS Equation 4.3-5
Non-identical materials and construction on the shearline:	Allowed, except for material type
Deflection Equation:	3-term from SDPWS 4.3-1
Drift limit for wind design:	1 / 360 story height
Force-transfer strap:	Continuous at top of highest opening and bottom of lowest

SITE INFORMATION

Wind — ASCE 7-16 Directional (All heights)		Seismic — ASCE 7-16 12.8 Equivalent Lateral Force Procedure	
Design Wind Speed	115 mph	Risk Category	Category II - All others
Serviceability Wind Speed	90 mph	Structure Type	Regular
Exposure	Exposure B	Building System	Bearing Wall
Enclosure	Enclosed	Design Category	B
Min Wind Loads: Walls	16 psf	Site Class	D
Roofs	8 psf		

Topographic Information [ft]			Spectral Response Acceleration	
Shape	Height	Length	S1: 0.067g	Ss: 0.114g
-	-	-		
Site Location: -				
Elev: 1038ft				
Rigid building - Static analysis				

			Fundamental Period	E-W	N-S
Case 2	E-W loads	N-S loads	T Used	0.113s	0.113s
Eccentricity (%)	15	15	Approximate Ta	0.113s	0.113s
Loaded at	75%		Maximum T	0.190s	0.190s
			Response Factor R	6.50	6.50
			Fa: 1.60	Fv: 2.40	

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Design Summary

SHEARWALL DESIGN

Wind Shear Loads, Flexible Diaphragm
All shearwalls have sufficient design capacity.

Components and Cladding Wind Loads, Out-of-plane Sheathing
All shearwalls have sufficient design capacity.

Components and Cladding Wind Loads, Nail Withdrawal
All shearwalls have sufficient design capacity.

Seismic Loads, Flexible Diaphragm
All shearwalls have sufficient design capacity.

HOLDDOWN DESIGN

Wind Loads, Flexible Diaphragm
All hold-downs have sufficient design capacity.

Seismic Loads, Flexible Diaphragm
All hold-downs have sufficient design capacity.

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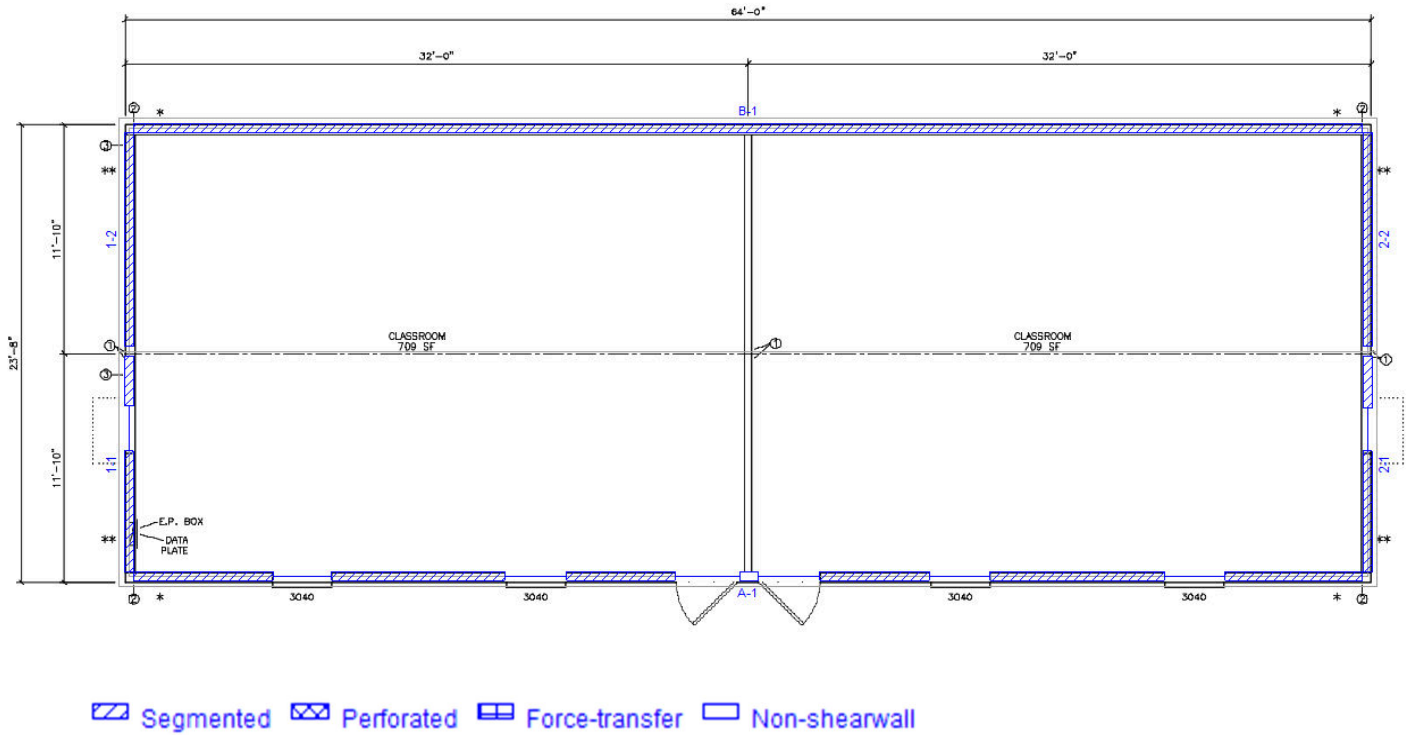
This Design Summary does not include failures that occur due to excessive story drift from ASCE 7 CC.2.2 (wind) or 12.12 (seismic).
Refer to Story Drift table in this report to verify this design criterion.
Refer to the Deflection table for possible issues regarding fastener slippage (SDPWS Table C4.2.2D).



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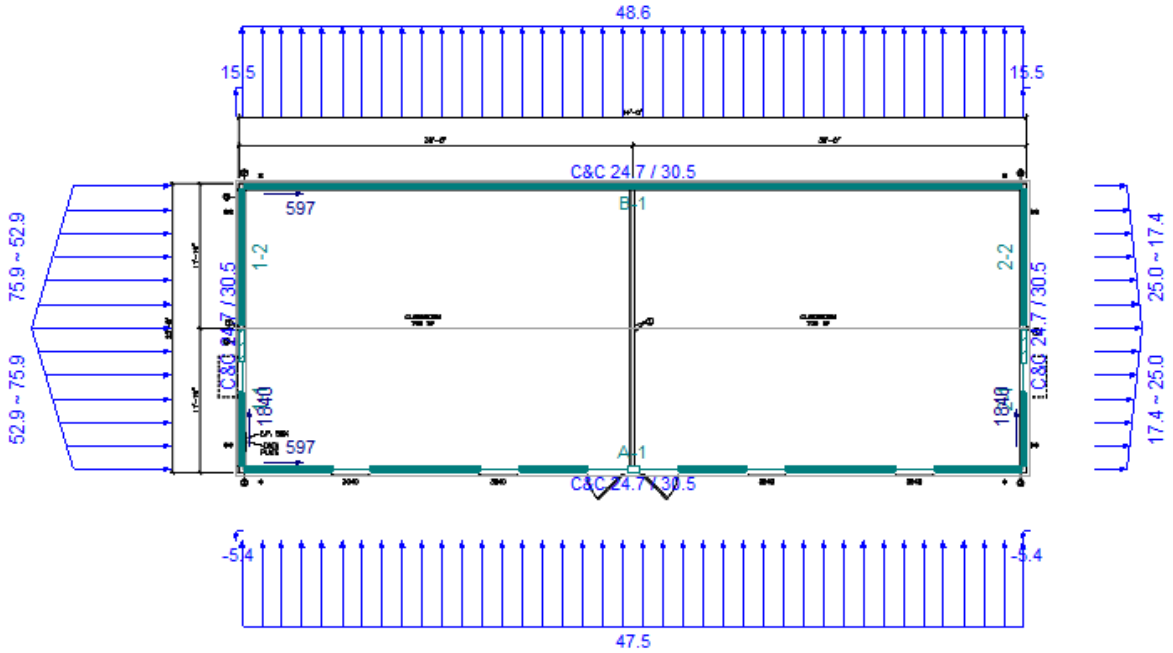

Factored shearline force (lbs)
Factored holddown force (lbs)
C Compression force exists
Vertical element required
Unfactored applied shear load (plf)
Unfactored dead load (plf,lbs)
Unfactored uplift wind load (plf,lbs)
Applied point load or discontinuous shearline force (lbs)

Loads: Directional Case 1 Wind (W); Forces: 0.6W + 0.6D; Flexible distribution

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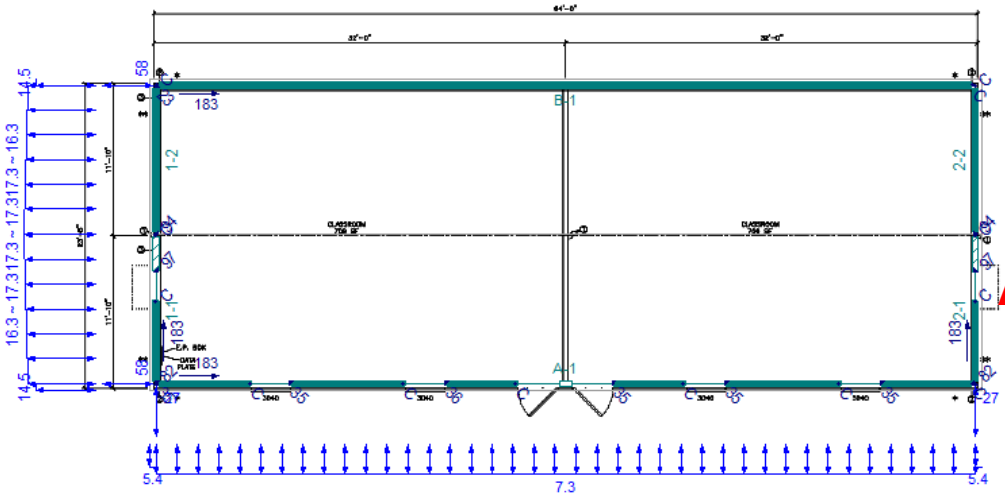

Factored shearline force (lbs)
Factored holddown force (lbs)
C Compression force exists
Vertical element required
Unfactored applied shear load (plf)
Unfactored dead load (plf,lbs)
Applied point load or discontinuous shearline force (lbs)

Loads: Seismic (Qe); Forces: 0.7E + 0.6D; E = pQe + 0.2 Sds D; p(NS) = 1.0; p(EW) = 1.0; Sds = 0.1; Flexible distribution

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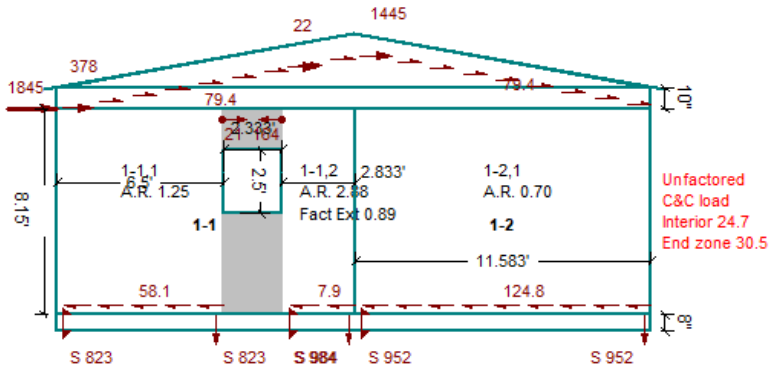
Shearline 1, at X = -0.08 ft, Flexible Diaphragm Wind Design.



A.R. - Aspect ratio; Fact - Aspect ratio factor

All shearwalls, Design group 0:
Exterior surface:
7/16" Structural I w/ 8d nails @ 6/12"
Interior surface:
1/2" Gypsum WBoard 1-ply w/ 5d nails @ 7/7"
Frame: S. Pine @ 16", blocked

Factored Forces

Vertical
- Holddown force (lbs)
- Compression force (lbs)
- S - Shear overturning (lbs)
- U - Wind uplift (lbs)
- D - Dead (lbs)

Horizontal
- Vs - Shearline force (lbs)
- Vs / diaphragm length (plf)
- V / full height sheathing (plf)
- Drag strut force (lbs)
- Strap/blocking force (lbs)

Factors: S,U = 0.6, D = 0.6 (tens); 1.0 (comp)
Combined: S - D + U (tens); S + D - U (comp)

Unfactored Loads
Dead Wind uplift

South **North**

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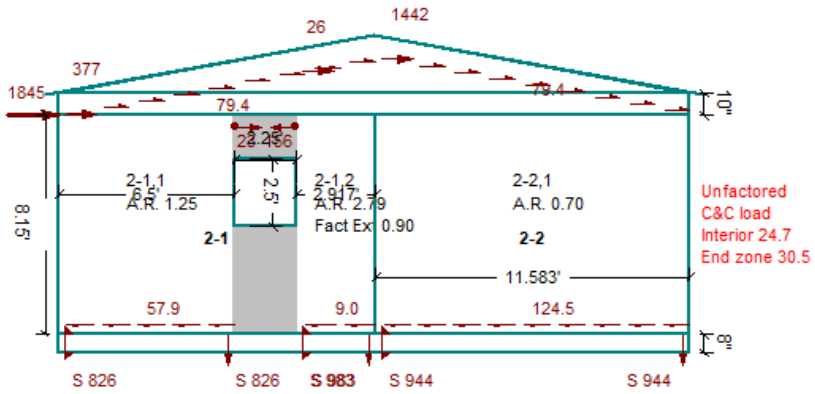
Shearline 2, at X = 63.58 ft, Flexible Diaphragm Wind Design.



A.R. - Aspect ratio; Fact - Aspect ratio factor

All shearwalls, Design group 0:
Exterior surface:
7/16" Structural I w/ 8d nails @ 6/12"
Interior surface:
1/2" Gypsum WBoard 1-ply w/ 5d nails @ 7/7"
Frame: S. Pine @ 16", blocked

Factored Forces

Vertical
- Holddown force (lbs)
- Compression force (lbs)
- S - Shear overturning (lbs)
- U - Wind uplift (lbs)
- D - Dead (lbs)

Horizontal
- Vs - Shearline force (lbs)
- Vs / diaphragm length (plf)
- V / full height sheathing (plf)
- Drag strut force (lbs)
- Strap/blocking force (lbs)

Factors: S,U = 0.6, D = 0.6 (tens); 1.0 (comp)
Combined: S - D + U (tens); S + D - U (comp)

Unfactored Loads
Dead Wind uplift

South **North**

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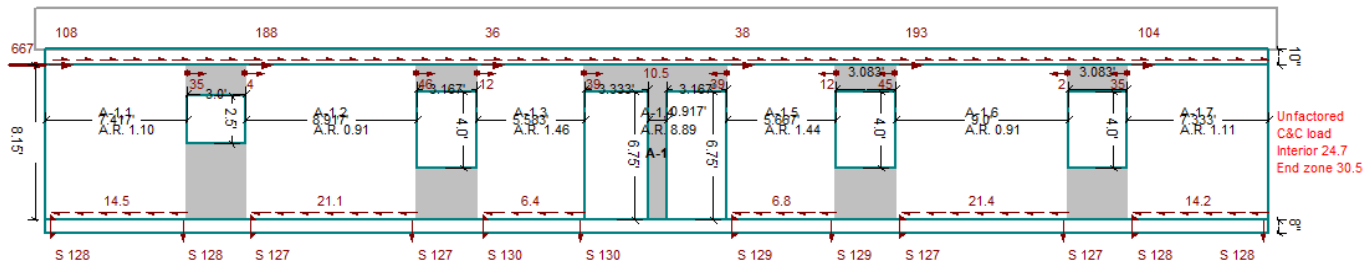
Shearline A, at Y = -23.17 ft, Flexible Diaphragm Wind Design.



A.R. - Aspect ratio; Fact - Aspect ratio factor

All shearwalls, Design group 0:
Exterior surface:
7/16" Structural I w/ 8d nails @ 6/12"
Interior surface:
1/2" Gypsum WBoard 1-ply w/ 5d nails @ 7/7"
Frame: S. Pine @ 16", blocked

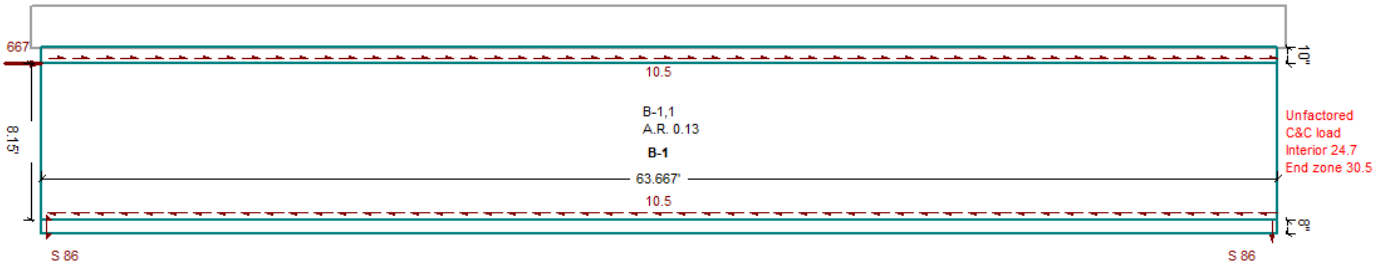
Factored Forces

Vertical	Horizontal
Holddown force (lbs)	Vs - Shearline force (lbs)
Compression force (lbs)	Vs / diaphragm length (plf)
S - Shear overturning (lbs)	V / full height sheathing (plf)
U - Wind uplift (lbs)	Drag strut force (lbs)
D - Dead (lbs)	Strap/blocking force (lbs)

Factors: S,U = 0.6, D = 0.6 (tens); 1.0 (comp)
Combined: S - D + U (tens); S + D - U (comp)
Unfactored Loads
Dead Wind uplift

West **East**

Shearline B, at Y = 0.08 ft, Flexible Diaphragm Wind Design.



A.R. - Aspect ratio; Fact - Aspect ratio factor

All shearwalls, Design group 0:
Exterior surface:
7/16" Structural I w/ 8d nails @ 6/12"
Interior surface:
1/2" Gypsum WBoard 1-ply w/ 5d nails @ 7/7"
Frame: S. Pine @ 16", blocked

Factored Forces

Vertical	Horizontal
Holddown force (lbs)	Vs - Shearline force (lbs)
Compression force (lbs)	Vs / diaphragm length (plf)
S - Shear overturning (lbs)	V / full height sheathing (plf)
U - Wind uplift (lbs)	Drag strut force (lbs)
D - Dead (lbs)	Strap/blocking force (lbs)

Factors: S,U = 0.6, D = 0.6 (tens); 1.0 (comp)
Combined: S - D + U (tens); S + D - U (comp)
Unfactored Loads
Dead Wind uplift

West **East**

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Sheathing Nail Withdrawal [NDS]

Plywood sheathing thickness	0.4375	t_{ply} =	7/16	inches	
Nail size			8d (2-1/2"x0.131")		
Nail diameter	0.131	D =	0.131	inches	
Nail length	2.50	L_{nail} =	2.50	inches	
Nail minimum penetration	1.38		1.38	inches	
Nail penetration, L_{nail} - t_{ply}		p =	2.06	inches	
Rafter wood species			Southern Pine		
Wood specific gravity		G =	0.55		[Table 11.3.2A.]
Nail withdrawal ref. design value		W =	1380 $G^{5/2}$ D		[11.2.3.]
		W =	41	lbs per nail, per inch penetration	
Load duration factor		C_D =	1.60	(D = 0.9, L = 1.0, S or L_r = 1.15, W or E = 1.6)	
Wet service factor		C_M =	1.00	(M.C. Fabrication = M.C. Service)	[Table 10.3.3.]
Temperature factor		C_t =	1.00		[Table 10.3.4.]
Nail withdrawal adj'd design value		W' =	W C_D C_M C_t		[Table 10.3.1.]
		W' =	64.9	lbs per nail, per inch penetration	
Withdrawal capacity per nail, W' p		P_{allow} =	134	lbs per nail	

Zone 3. [Connection ID] : Corners of roof sheathing to rafter due to wind uplift

Wind uplift pressure	55.9	q =	55.9	psf
Wind load factor			0.60	
Members spacing	24	s_{member} =	24	inches o.c.
Nails spacing		s_{nail} =	9	inches o.c.
Sheathing wind uplift area per nail		A =	1.50	ft^2 / nail
Nail withdrawal force, A q		$P_{applied}$ =	50	lbs / nail
Capacity ratio		$P_{applied}$ / P_{allow} =	0.376	< 1.00. O.K.

Zone 2. [Connection ID] : Edges of roof sheathing to rafter due to wind uplift

Wind uplift pressure	41.0	q =	41.0	psf
Wind load factor			0.60	
Members spacing		s_{member} =	24	inches o.c.
Nails spacing		s_{nail} =	9	inches o.c.
Sheathing wind uplift area per nail		A =	1.50	ft^2 / nail
Nail withdrawal force, A q		$P_{applied}$ =	37	lbs / nail
Capacity ratio		$P_{applied}$ / P_{allow} =	0.276	< 1.00. O.K.

Zone 1. [Connection ID] : Middle of roof sheathing to rafter due to wind uplift

Wind uplift pressure	31.1	q =	31.1	psf
Wind load factor			0.60	
Members spacing		s_{member} =	24	inches o.c.
Nails spacing		s_{nail} =	12	inches o.c.
Sheathing wind uplift area per nail		A =	2.00	ft^2 / nail
Nail withdrawal force, A q		$P_{applied}$ =	37	lbs / nail
Capacity ratio		$P_{applied}$ / P_{allow} =	0.279	< 1.00. O.K.

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Wall Sheating Out-of-Plane Capacity [NDS - SDPWS]

Table 3.2.1 Nominal Uniform Load Capacities (psf) for Wall Sheathing Resisting Out-of-Plane Wind Loads[1]

Sheathing Type[4]	Span Rating or Grade	Minimum Thickness (in.)	Strength Axis[5]							
			Perpendicular to Supports				Parallel to Supports			
			Maximum Stud Spacing (in.)	Actual Stud Spacing (in.)			Maximum Stud Spacing (in.)	Actual Stud Spacing (in.)		
				12	16	24		12	16	24
				Nominal Uniform Loads (psf)				Nominal Uniform Loads (psf)		
Wood Structural Panels (Sheathing Grades, C-C, C-D, C-C Plugged, OSB)[2,5]	24/0	3/8	24	425	240	105	24	90	50	30[3]
	24/16	7/16	24	540	305	135	24	110	60	35[3]
	32/16	15/32	24	625	355	155	24	155	90	45[3]
	40/20	19/32	24	955	595	265	24	255	145	75[3]
	48/24	23/32	24	1160[3]	840[3]	395[3]	24	455[3]	255[3]	115[3]
Particleboard Sheathing (M-S Exterior Glue)		3/8	16	(contact manufacturer)			16	(contact manufacturer)		
		1/2	16				16			
Particleboard Panel Siding (M-S Exterior Glue)		5/8	16	(contact manufacturer)			16	(contact manufacturer)		
		3/4	24				24			
Hardboard Siding (Direct to Studs)	Lap Siding	7/16	16	460	260	-	-	-	-	-
	Shiplap Edge Panel Siding	7/16	24	460	260	115	24	460	260	115
	Square Edge Panel Siding	7/16	24	460	260	115	24	460	260	115
Cellulosic Fiberboard Sheathing	Regular	1/2	16	90	50	-	16	90	50	-
	Structural	1/2	16	135	75	-	16	135	75	-
	Structural	25/32	16	165	90	-	16	165	90	-

Strength Axis		Perpendicular		to supports
Wood Structural Panels		7/16	in	
Actual stud spacing	16	16	in	
Nominal Capacity	305	305	psf	
Safety Factor		1.6		[3.2.1]
Allowable Capacity		191	psf	ASD Level
Wall C&C Wind load	26.1	26.1	psf	Strength Level
Load Factor		0.6		
Applied Load		16	psf	ASD Level
Utilization Ratio		8%	o.k.	

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Company :	Modular Structural Consultants, LLC.	Project No :	2279-2280	MSC# M20027
Engineer :	Yuri Yurianto, S.E., P.E., M.Sc.	Project Name :	Dry Classroom Building	
Address :	5760 Legacy Dr. B3-333. Plano, TX 75024	Location :	Classroom Lee's Summit MO	
Phone:	(972) 896-5373	Subject :	Modular 23.67'x64'	
Email:	yurianto@modularconsultant.com	Date:	6/11/2020	Final

Roof Sheating Out-of-Plane Capacity [NDS - SDPWS]

Table 3.2.2 Nominal Uniform Load Capacities (psf) for Roof Sheathing Resisting Out-of-Plane Wind Loads[1,2,6]

Sheathing Type[5]	Span Rating or Grade	Minimum Thickness (in.)	Strength Axis[7] Applied Perpendicular to Supports						Strength Axis[7] Applied Parallel to Supports		
			Rafter/Truss Spacing (in.)						Rafter/Truss Spacing (in.)		
			12	16	19.2	24	32	48	12	16	24
			Nominal Uniform Loads (psf)						Nominal Uniform Loads (psf)		
Wood Structural Panels (Sheathing Grades, C-C, C-D, C-C Plugged, OSB)	24/0	3/8	425	240	165	105	-	-	90	50	30[3]
	24/16	7/16	540	305	210	135	-	-	110	60	35[3]
	32/16	15/32	625	355	245	155	90	-	155	90	45[3]
	40/20	19/32	955	595	415	265	150	-	255	145	75[3]
	48/24	23/32	1160[3]	840[3]	615[3]	395[3]	220[3]	100[3]	455[3]	255[3]	115[3]
Wood Structural Panels (Single Floor Grades, Underlayment, C-C Plugged)	16 o.c.	19/32	705	395	275	175	100	-	170	95	50[3]
	20 o.c.	19/32	815	455	320	205	115	-	235	135	70[3]
	24 o.c.	23/32	1160[3]	670[3]	465[3]	300[3]	170[3]	-	440[3]	250[3]	110[3]
	32 o.c.	7/8	1395[4]	1000[4]	695[4]	445[4]	250[4]	110[4]	1160[4]	655[4]	290[4]
	48 o.c.	1-1/8	1790[4]	1295[4]	1060[4]	805[4]	455[4]	200[4]	1790[4]	1145[4]	510[4]

Strength Axis		Perpendicular		to supports
Wood Structural Panels		7/16	in	
Rafter/Truss Spacing	24	24	in	
4 Nominal Capacity	135	135	psf	
Safety Factor		1.6		[3.2.3]
Allowable Capacity		84	psf	ASD Level
Roof C&C Wind load	55.9	55.9	psf	Strength Level
Load Factor		0.6		
Applied Load		34	psf	ASD Level
Utilization Ratio		40%	o.k.	

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DATE 6/23/20
PFS CORPORATION
Cottage Grove, WI

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ENERGY DESIGN CRITERIA:

NOTE: UNLESS OTHERWISE NOTED, ALL CODE REFERENCES BELOW ARE FROM THE 2015 IECC

CLIMATE ZONES: 4A AS SHOWN IN TABLE 301.1
FOR BUILDINGS WITH OVERALL WINDOWS AND GLAZED DOOR OPENINGS TOTALING 10% OR LESS OF THE GROSS ABOVE-GRADE WALL AREA.

HEATING DEGREE DAYS: 4964 COOLING DEGREE DAYS: 1565

R-VALUES PROVIDED ARE AS REQUIRED TO PASS COMCHECK ENERGY COMPLIANCE SOFTWARE FOR THE 2015 IECC:

ROOF: ALL WOOD JOIST / TRUSS: R-30
WALL: WOOD FRAMED: R-19
FLOOR: ALL WOOD JOIST / TRUSS: R-30

U-FACTOR FOR WINDOWS: DUAL PANE/ LOW-E GLASS = 0.49
SHGC FOR WINDOWS: DUAL PANE/ LOW-E GLASS = 0.25
U-FACTOR FOR DOORS: STEEL DOOR = 0.20

LIGHTING CONTROLS: OCCUPANT SENSOR CONTROLS FOR INTERIOR LIGHTING.
PHOTOCELL CONTROLS FOR EXTERIOR LIGHTING

GENERAL LIGHTING: LED LIGHT WITH 4800 LUMEN LIGHT MODULE

EXTERIOR LIGHTING: WALL MOUNTED LED LIGHT MODULE ON PHOTOCELL

HVAC EFFICIENCY: WALL HUNG ELECTRIC HVAC UNITS: MIN. 9.0 EER

SYSTEM CONTROLS: PROGRAMMABLE THERMOSTAT WITH OCCUPANT OVERRIDE PER 503.2.4

OUTDOOR AIR VENTILATION RATE OF: 230.2 CFM PER EQUATION 4-1 AND TABLE 403.3.1.1 OF THE 2015 IMC

DUCT INSULATION: WHERE DUCTING IS USED, DUCTS SHALL BE SEPARATED FROM THE BUILDING EXTERIOR BY A MINIMUM OF R-8 INSULATION. (NOTE: DUCTING USED BY PALOMAR HAS A MINIMUM R-VALUE OF 5.6, AND IS CONTAINED WITHIN THE BUILDING ENVELOPE.)

DUCT SEALING: DUCTS ARE TO BE SEALED IN ACCORDANCE WITH 503.2.7

ROOF: PAINTED METAL, ROOF SLOPE MUST EXCEED 2:12.

NOTES:

DATA PLATE(S) TO BE INSTALLED ON THE COVER OF THE ELECTRICAL DISTRIBUTION PANEL AS NOTED ON SHEET A-2.

DECALS TO BE INSTALLED ON THE REAR END, ON THE LOWER LEFT-HAND CORNER OF MODULES WITH METAL SIDING. BUILDINGS WITH SIDINGS WHICH ARE TO BE PAINTED AS A PART OF ROUTINE MAINTENANCE, THE DECALS ARE TO BE LOCATED ON THE REAR END WALL OF THE MODULE, NEAR THE MATELINE, ABOVE THE SUSPENDED CEILING TILE. BUILDING WITH PAINTABLE SIDINGS AND HARD CEILINGS ARE TO HAVE THE DECALS LOCATED AS NOTED ON A-2.

PFS Corporation
Approval Limited to Factory-Built Portion Only
State: Missouri
Signature:
Title: Staff Plan Reviewer
Date: 06/23/2020

SPECIAL CONDITIONS AND / OR LIMITATIONS:

NOTE:
MATERIALS WHICH EQUAL OR EXCEED THOSE SPECIFIED MAY BE SUBSTITUTED.

NOTE:
BUILDING IS TO BE LOCATED A MINIMUM OF 10 FT. FROM PROPERTY LINE OR ASSUMED PROPERTY LINE.

PORTABLE FIRE EXINGUISHERS TO BE PROVIDED AND INSTALLED BY OWNER

NOTE:
ACCESSIBLE DRINKING FOUNTAIN WILL BE PROVIDED ON SITE BY OWNER.

NOTE:
SERVICE SINK TO BE PROVIDED IN ADJACENT BLDG.

NOTE:
BUILDING MUST BE LOCATED WITH IN 500 FT. OF AN EXISTING BUILDING PROVIDING TOILET FACILITIES CAPABLE OF SERVICING THE COMBINED OCCUPANT LOAD OF THE EXISTING BUILDING(S) IN ADDITION TO THIS BUILDING.

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ACCESSIBILITY REQUIREMENTS:

NOTE:
HANDICAP ACCESSIBLE RAMP TO BE INSTALLED BY OTHERS IN ACCORDANCE WITH THE A.D.A. GUIDELINES.

DESIGN CRITERIA:

CODES: 2015 IBC
2015 IPC
2015 IMC
2014 NEC

2015 IECC
ANSI A 117.1 - 2009

STATE OF MISSOURI
YURIANTO YURIANTO
NUMBER PE-2016009131
PROFESSIONAL ENGINEER
By Yuri at 4:19:43 PM, 6/11/2020

OCCUPANCY CLASSIFICATION: E
OCCUPANCY CATEGORY: II
CONSTRUCTION TYPE: V-B
APPLIANCE FUEL TYPE: NONE

DESIGN LOADS:

ROOF LIVE LOAD:	20 PSF
FLOOR LIVE LOAD:	40 PSF
CONCENTRATED FLOOR LOAD:	1000 LBS
GROUND SNOW LOAD:	20 PSF
ROOF SNOW LOAD:	20 PSF
WIND SPEED Vult:	115 MPH
WIND SPEED asd:	89
EXPOSURE:	B
SEISMIC DESIGN CATEGORY:	B
BUILDING AREA:	1515 S.F.
OCCUPANT LOAD:	70
OCCUPANT AGE GROUP:	ELEMENTARY 6-11 YEARS

DRAWING INDEX:

DRY CLASSROOM BUILDING

S/N: 2279-2280

SHEET No.

A-1

MODULAR STRUCTURAL CONSULTANTS LLC
TX. REG. #: F-15892
9720 COIT RD. STE. 220-150
PLANO, TX. 75025-5833
TEL. (469) 896-5373

PALOMAR
MODULAR BUILDINGS LLC
505 NORTH I-35 E DESOTO, TX.
75115 Ph: 469-727-4727
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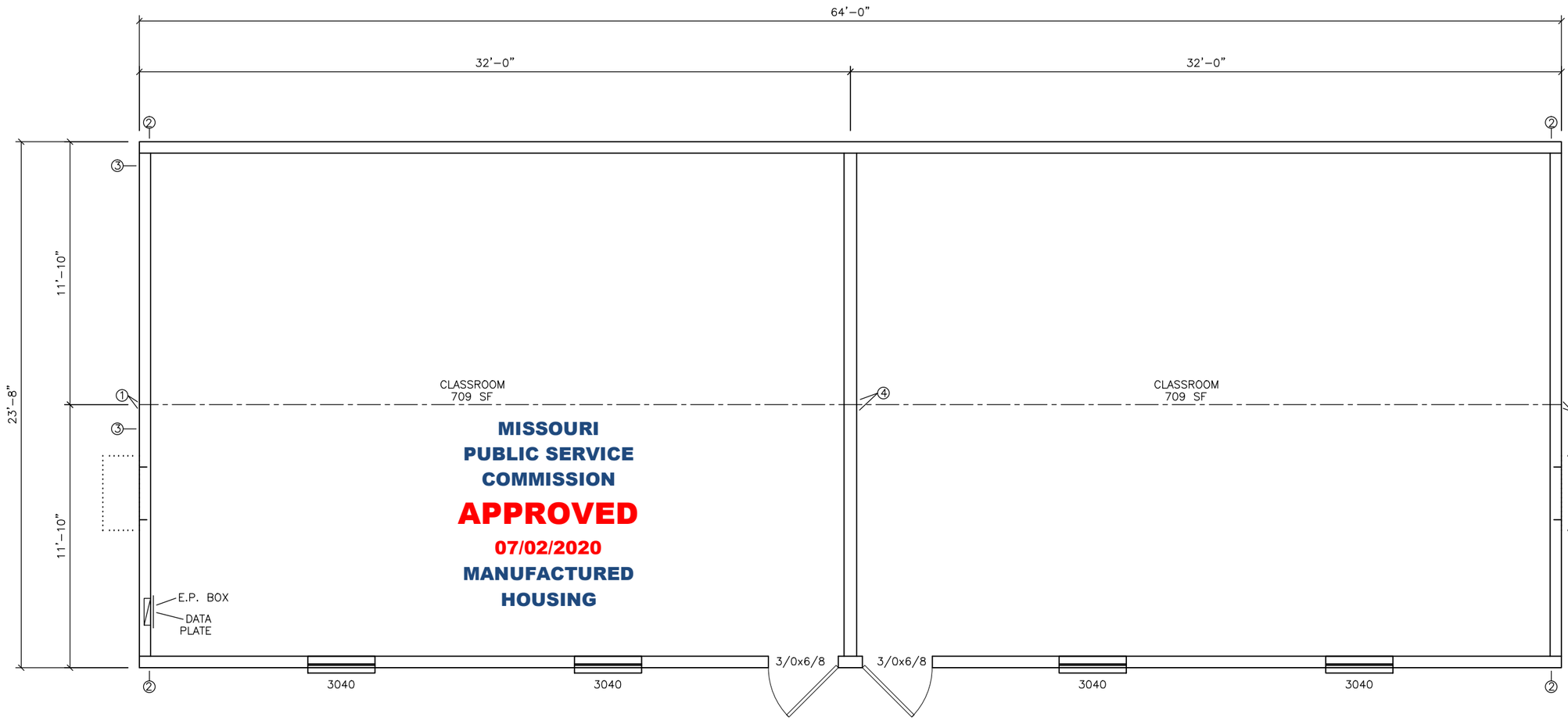
No.	DESCRIPTION	BY	Date

DATE: 6/9/20
SCALE: N.T.S.
PLOT SCALE: N.T.S.
DRAWN BY: NM
CHECK BY:

COVER SHEET / SPECIFICATIONS
DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
Dwg No. 2464 Dry Classroom
S/N: 2279-2280



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YURIANTO YURIANTO
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PROFESSIONAL ENGINEER

By Yuri at 4:19:46 PM, 6/11/2020

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DOOR LEGEND					
CALLOUT	NOMINAL SIZE	MATERIAL	HARDWARE	GLAZING	NOTES
3/0x6/8	3'-0" x 6'-8"	18ga. STEEL DOOR	PULL / PANIC	6x27	CLOSER, WEATHERSTRIP, DRIP CAP
3/0 V	3'-0" x 6'-8"	PREFIN. SOLID CORE	LEVER / PRIVACY	NONE	
THRESHOLDS AT DOORS NOT TO EXCEED 1/2", AND ARE TO BE BEVELED IF IN EXCESS OF 1/4"					
ALL DOOR HARDWARE TO BE SARGENT					

WINDOW LEGEND							
CALLOUT	NOMINAL SIZE	LIGHT	VENT	MATERIAL	FINISH	STYLE	GLAZING
3040	36" x 48"	10.51	5.25	ALUMINUM	BRONZE	SINGLE HUNG	DUAL / CLEAR / LOW-E

NOTES:
UNLESS NOTED OTHERWISE, ALL EXTERIOR WALLS ARE TO BE SHEATHED WITH OSB AND USED AS SHEAR WALLS.

(1) – DENOTES 3–EA. 2x6's AND 1–EA. 3" WIDE x 26ga. STRAP AT MATE–LINE FASTENED W/ 11 – 1 1/2" x .140 NAILS EACH END OF EACH STRAP.

(2) – DENOTES 2–EA. 2x4's AND 1–EA. 3" WIDE x 26ga. STRAP AT END OF EACH SIDEWALL FASTENED W/ 11 – 1 1/2" x .140 NAILS EACH END OF EACH STRAP. INSTALL 2x6's IN 2x6 WALLS.

(3) – DENOTES TDLR LABEL LOCATION

(4) – DENOTES 4–EA. #2 SYP MIN. 2x6's AND 1–EA. SIMPSON MSTC28 STRAP AT MATE–LINE AT RIDGE BEAM TO COLUMN, FASTENED WITH 18 – 16d SINKERS (0.148" x 3 1/4")

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1 FLOOR PLAN
SCALE: 1/8" = 1'-0"

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PLANO, LEE'S SUMMIT, MO 75025-5833
PHONE: 972-896-5373
TX. REGISTRATION # F-15892

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
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PLOT SCALE: 1:1
DRAWN BY: NM
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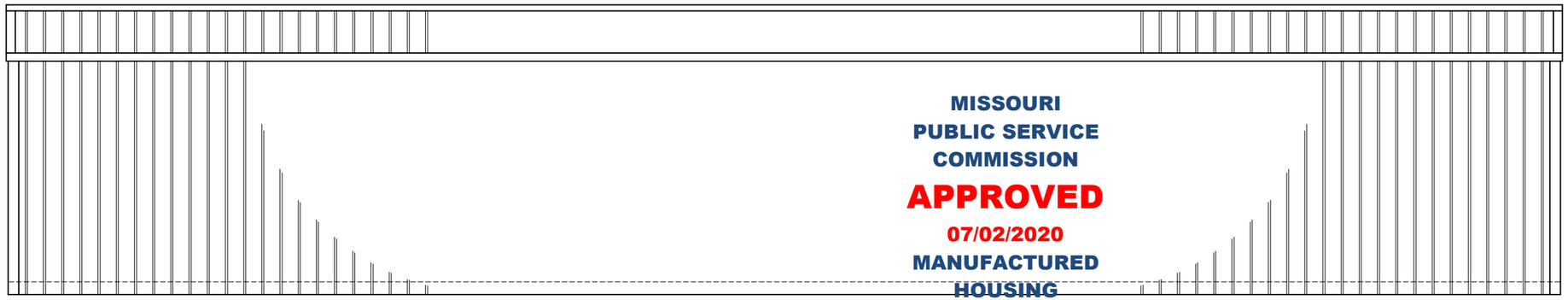
DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
FLOOR PLAN
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
A-2

P:\PALOMAR\Drawings\2279-80 - Lees Summit\2464 DRY CLASSROOM 2.dwg, 6/11/2020 3:50:16 PM, NMiller



64'–0"

4 SOUTH ELEVATION
SCALE: 3/16" = 1'-0"

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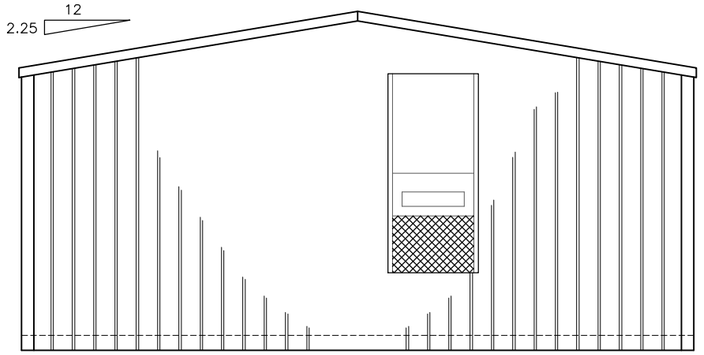
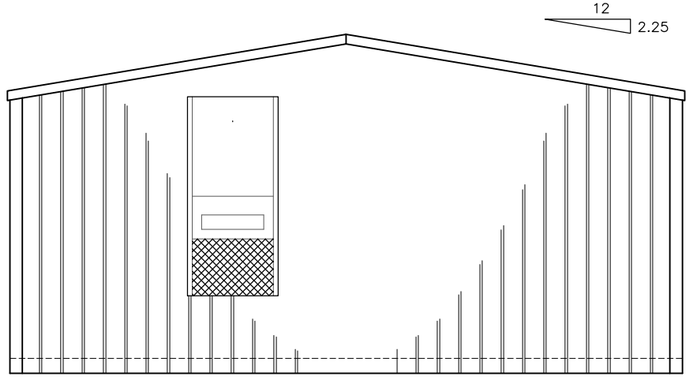
By Yuri at 4:19:49 PM, 6/11/2020



23'–8"

3 EAST ELEVATION
SCALE: 3/16" = 1'-0"



23'–8"

2 WEST ELEVATION
SCALE: 3/16" = 1'-0"

NOTES:
1) STEEL SIDING PANELS ARE MIN. 0.0150" THICK BASE METAL CONFORMING TO TABLE 1405.2 OF THE 2015 IBC.
2) PAINTED METAL ROOFING PANELS CONFORM TO THE REQUIREMENTS OF ASTM A 792 AZ 50 PER TABLE 1507.4.3(1) AND 1507.4.3(2) OF THE 2015 IBC. APPLY LAP SEALANT TO LAPPED SEAMS OF ROOF PANELS. FASTEN PER MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR HIGH WIND AREAS.

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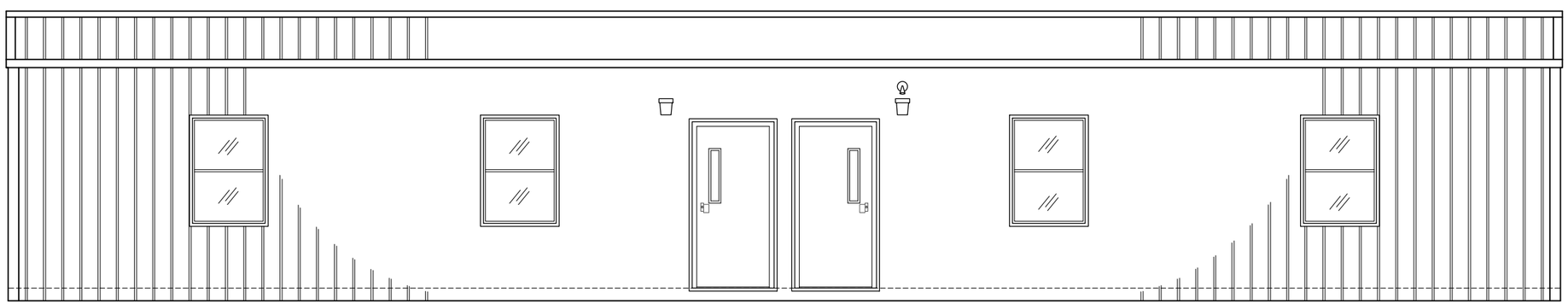

64'–0"

1 NORTH ELEVATION
SCALE: 3/16" = 1'-0"

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 3/16" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: NM
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DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
EXTERIOR ELEVATIONS
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
A-3

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GENERAL NOTES

1. STANDARD PAD ON GRADE, ABS BASE WITH CMU BLOCK
2. M12x11.8 FRAME RAILS CONFORMING TO ASTM A529–50
3. WOVEN POLYETHELYENE BOTTOM BOARD
4. SKIRTING INSTALLED ON SITE AFTER UNIT ASSEMBLY
5. 2–2x8 #3 SYP MIN. FLOOR RIM JOISTS
6. R–30 INSULATION IN FLOOR CAVITY (COMPRESSED TO R–25)
7. 2x8 # 2 SYP MIN. FLOOR JOISTS AT 16"o.c.
8. 3/4" MIN. T&G ADVANTECH DECKING
9. VINYL COMPOSITION FLOOR TILE &/OR COMMERCIAL GRADE CARPET (TO BE INSTALLED BY OWNER)
10. SIDEWALL STRAPPED TO FLOOR WITH 1 1/2" x 30ga GALVANIZED STRAPS AT 48"o.c. FASTENED WITH 6–16ga STAPLES EACH END OF EACH STRAP.
11. 2x6 #3 SYP MIN. BOTTOM PLATE
12. R–19 INSULATION IN EXTERIOR WALLS (COMPRESSED TO R–18)
13. 2x6 #2 SYP MIN. STUDS AT 16"o.c.
14. 7/16" RATED SHEATHING OSB UNDER A WEATHER–RESISTIVE BARRIER CONFORMING TO 1404.2 OF THE 2015 IBC, FASTENED WITH 8d NAILS AT 6"o.c. AT EDGES AND 12"o.c. IN THE FIELD
15. STEEL SIDING PANELS CONFORMING TO TABLE 1405.2 OF THE 2015 IBC
16. R–11 INSULATION IN INTERIOR WALLS
17. 2x6 #2 SYP MIN. AT 16"o.c. INTERIOR WALLS
18. 2–2x6 #3 SYP MIN. EXTERIOR WALL TOP PLATES
19. VINYL CLAD 5/8" TYPE 'X' GYPSUM WALLBOARD.
20. SUSPENDED GRID ACOUSTIC CEILING
21. POLY NETTING ON BOTTOM OF RAFTERS
22. NOT USED
23. ROOF STRAPPED TO SIDEWALL WITH 1 1/2" x 30ga GALV. STRAPS AT 48"o.c. FASTENED WITH 6–16ga STAPLES EACH END OF EACH STRAP
24. 2x10 #2 SYP MIN. ROOF RIM JOIST
25. R–30 INSULATION IN RAFTER CAVITY
26. 2x10 #2 SYP MIN RAFTERS AT 24"o.c.
27. FOUR LAYER SOLID PLYWOOD RIDGE BEAM, EACH LAYER OF 3/4", 5–LAYER, 5–PLY GROUP 1 SPECIES PLYWOOD. BEAM IS CONSTRUCTED PER THE APA "DESIGN AND FABRICATION OF ALL–PLYWOOD BEAMS" SUPPLEMENT 5
28. RAFTERS STRAPPED TO RIDGE BEAM WITH 1 1/2" x 30ga STRAP FASTENED WITH 6–16ga STAPLES EACH END OF EACH STRAP.
29. 7/16" SHEATHING RATED OSB, FASTENED W/ 8d NAILS AT 4"o.c. EDGES AND 8"o.c. FIELD, OVER 15# FELT PAPER
30. GALVALUME ROOFING PANELS CONFORMING TO ASTM A 792 AZ50 PER TABLES 1507.4.3(1) OF THE 2015 IBC
31. 2x4 LEDGER FASTENED TO RIDGE BEAM W/3–16d NAILS EACH RAFTER LOCATION OR SIMPSON MMLU–26 JOIST HANGER FASTENED WITH 4–1 1/2" x 10d NAILS TO BEAM AND 2–1 1/2" x 8d NAILS TO RAFTER
32. UNITS FASTENED TOGETHER AT FLOOR AND RIDGE BEAM WITH 3/8" x 6" LAG BOLTS AT 32"o.c. STAGGERED
33. INSTALL BRACING WITHIN 48" OF INTERIOR COLUMN AND 12'–0"o.c. MAX. THROUGHOUT OPEN SPANS

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By Yuri at 4:19:50 PM, 6/11/2020

NOTES:

1. CRAWL SPACE TO BE VENTILATED IN ACCORDANCE WITH 2015 INTERNATIONAL BUILDING CODE SECT. 1203.3.2 INSTALL SO AS TO PROVIDE CROSS–VENTILATION OF CRAWL SPACE. INSTALL MIN. 18" x 24" ACCESS PANEL IN SKIRTING.
2. BLOCK HEIGHTS SHOWN ARE TYPICAL. ANY BLOCK STACKS, OTHER THAN AT MATELINES, REQUIRING MORE THAN THREE 8" x 8" x 16" BLOCKS MUST BE DOUBLED. THIS DOES NOT CHANGE ANCHORING LOCATIONS OR QUANTITIES.
3. FRONT CROSS–MEMBER IS FULL DEPTH I–BEAM (SAME AS CHASSIS) HITCH / COUPLER IS VENTURE OR EQUIVALENT 30,000# MIN. RATED TIRES ARE 8 x 14.5, 8–ply, 2805# MIN LOAD RATING FRAME PAINT IS EMULSION BASE PAINT OUTRIGGERS AND U–CHANNEL CROSS–MEMBERS ARE 14 ga. MIN. OUTRIGGER SIZES: 11'–10" FLOOR – 7" x 16" OUTRIGGER
4. METAL ROOF AND WALL PANELS TO BE FASTENED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR THE APPROPRIATE WIND SPEED FOR THE BUILDINGS INSTALLATION LOCATION (SEE SHEET A–1).

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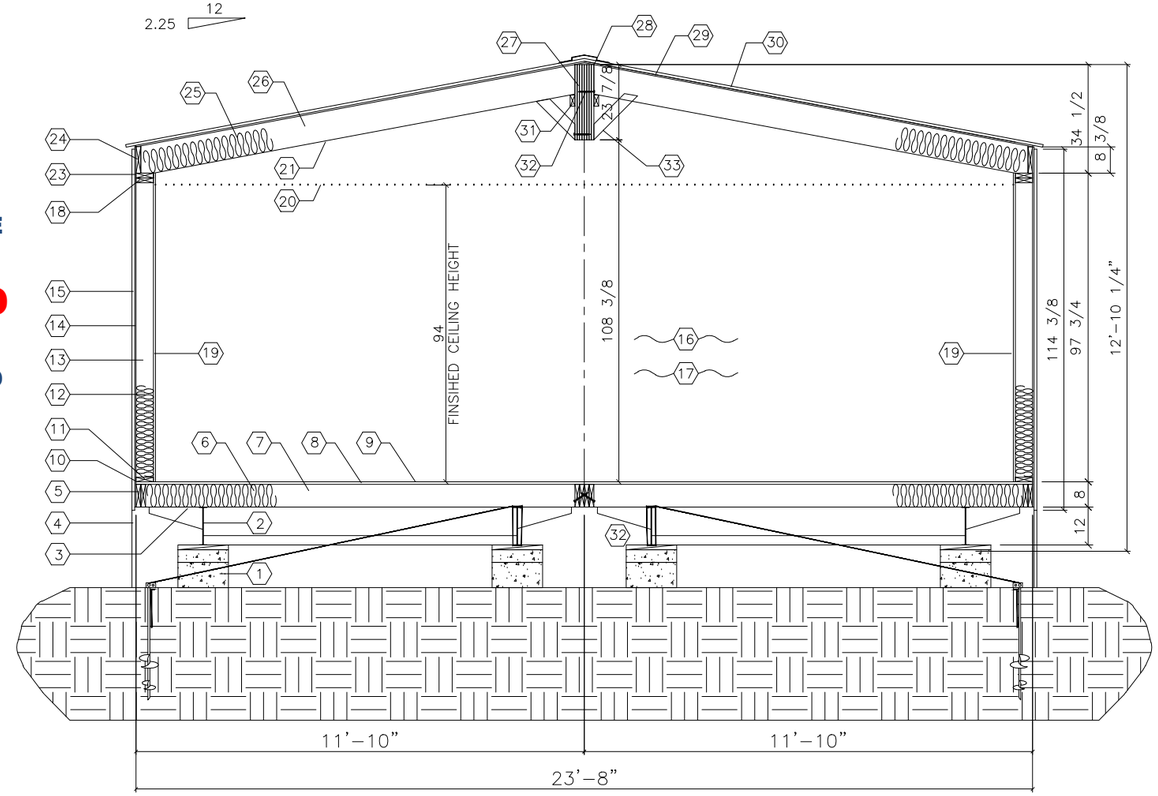
PRODUCTION HEIGHT: 13'–7"
TRANSPORTATION HEIGHT: 14'–10"



1 CROSS SECTION
SCALE: 1/4" = 1'-0"

MODULAR STRUCTURAL CONSULTANTS LLC
9720 COIT RD. STE. 220–150
PLANO, LEE'S SUMMIT, MO 75025–5833
PHONE: 972–896–5373
TX. REGISTRATION # F–15892

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PH: 469–727–0727

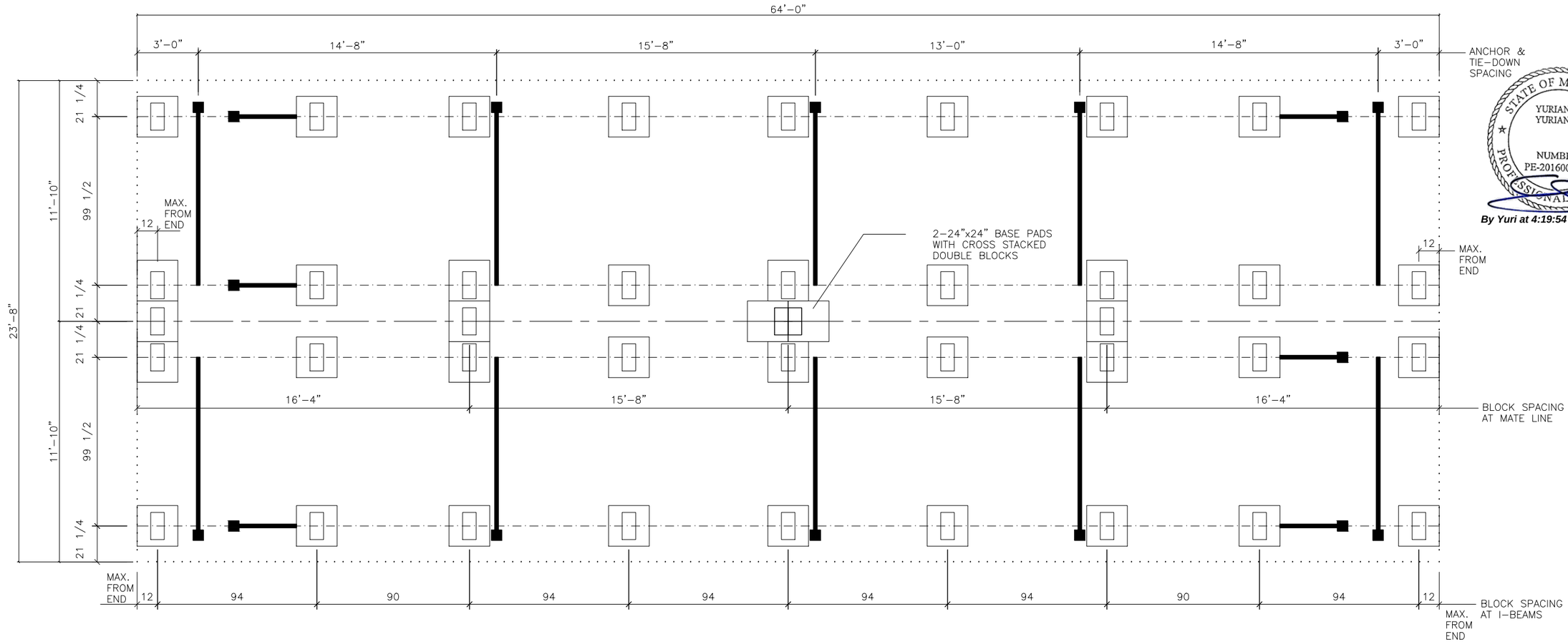
No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 1/4" = 1'–0"
PLOT SCALE: 1:1
DRAWN BY: NM
CHECKED BY:

DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
CROSS SECTION
2464 DRY CLASSROOM
SERIAL #: 2279–2280

SHEET No.
A-4

P:\PALOMAR\Drawings\2279-80 - Lees Summit\2464 DRY CLASSROOM 2.dwg, 6/11/2020 3:50:26 PM, NMiller



SYMBOL LEGEND

LATERAL FRAME TIE-DOWN STRAP SECURED TO I-BEAM AT AN ANGLE NOT TO EXCEED 45° FROM HORIZONTAL

LONGITUDINAL FRAME TIE-DOWN STRAP SECURED TO BOTTOM OF I-BEAM AT AN ANGLE NOT TO EXCEED 45° FROM HORIZONTAL

NOTES:

1. BLOCK SPACING MAY VARY DUE TO AXLE HANGERS OR OTHER STRUCTURAL OBSTRUCTIONS.
2. BASE PADS ARE TO BE 24" x 24" ABS PADS. ADDITIONAL BASE PADS MAY BE USED AT EXTERIOR DOOR LOCATIONS FOR DOOR ADJUSTMENT WHERE NECESSARY.
3. SINGLE BLOCK STACKS ARE LIMITED TO THREE BLOCKS HIGH. ANY BLOCK STACK REQUIRING MORE THAN THREE 8" x 8" x 16" BLOCKS MUST BE DOUBLED AND CROSS-STACKED. THIS DOES NOT CHANGE ANCHORING LOCATIONS OR QUANTITIES.
4. ASSUMED SOIL BEARING CAPACITY IS 2000 PSF. SITE SPECIFIC SOIL CONDITIONS ARE TO BE VERIFIED BY OWNER, OR OWNER'S AGENT.

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YURIANTO YURIANTO
NUMBER PE-2016009131
PROFESSIONAL ENGINEER
By Yuri at 4:19:54 PM, 6/11/2020

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1 BLOCKING & TIE-DOWN LAYOUT
SCALE: 3/16" = 1'-0"

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 3/16" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: NM
CHECKED BY:

DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
BLOCKING & TIE-DOWN LAYOUT
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
S-1

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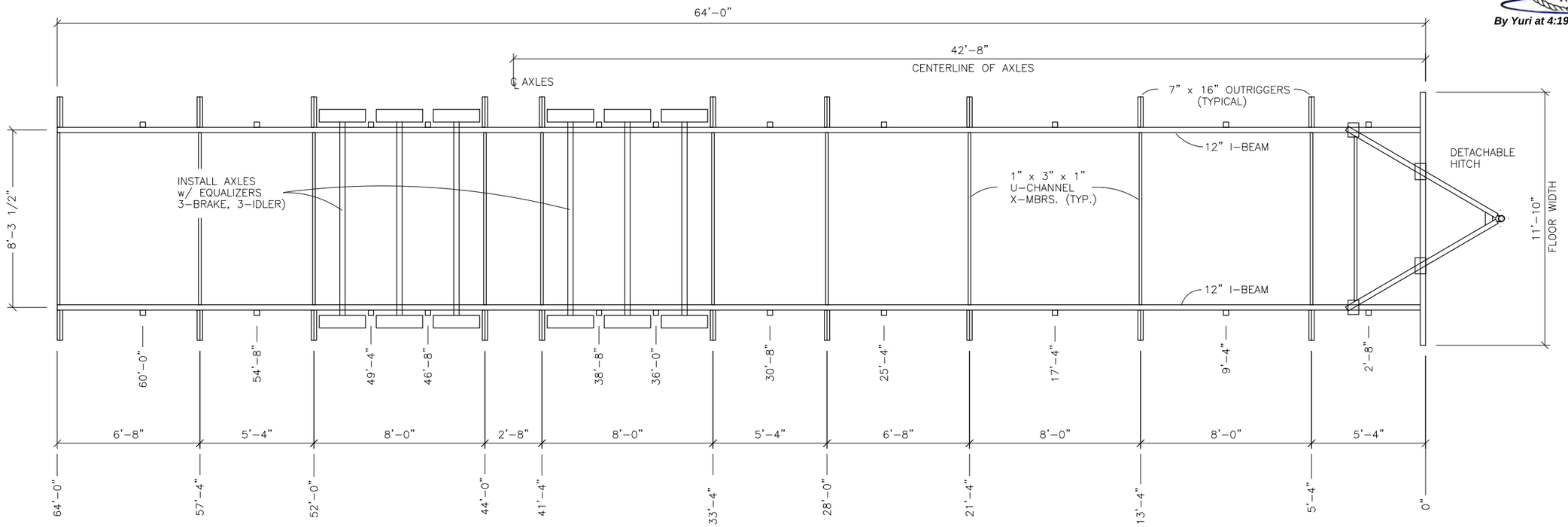

NOTES:
FRONT CROSS-MEMBER IS FULL DEPTH I-BEAM (SAME AS CHASSIS)
HITCH / COUPLER IS VENTURE OR EQUIVALENT 30,000# MIN. RATED
TIRES ARE 8 x 14.5, 8-ply, 2805# MIN LOAD RATING
FRAME PAINT IS EMULSION BASE PAINT
OUTRIGGERS AND U-CHANNEL CROSS-MEMBERS ARE 14 ga. MIN.

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STATE OF MISSOURI
YURIANTO YURIANTO
NUMBER PE-2016009131
PROFESSIONAL ENGINEER
By Yuri at 4:19:56 PM, 6/11/2020

1 CHASSIS LAYOUT
SCALE: 3/16" = 1'-0"

MODULAR STRUCTURAL CONSULTANTS LLC
9720 COIT RD. STE. 220-150
PLANO, LEE'S SUMMIT, MO 75025-5833
PHONE: 972-896-5373
TX. REGISTRATION # F-15892

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DESOTO, LEE'S SUMMIT, MO 75115
PH: 469-727-0727

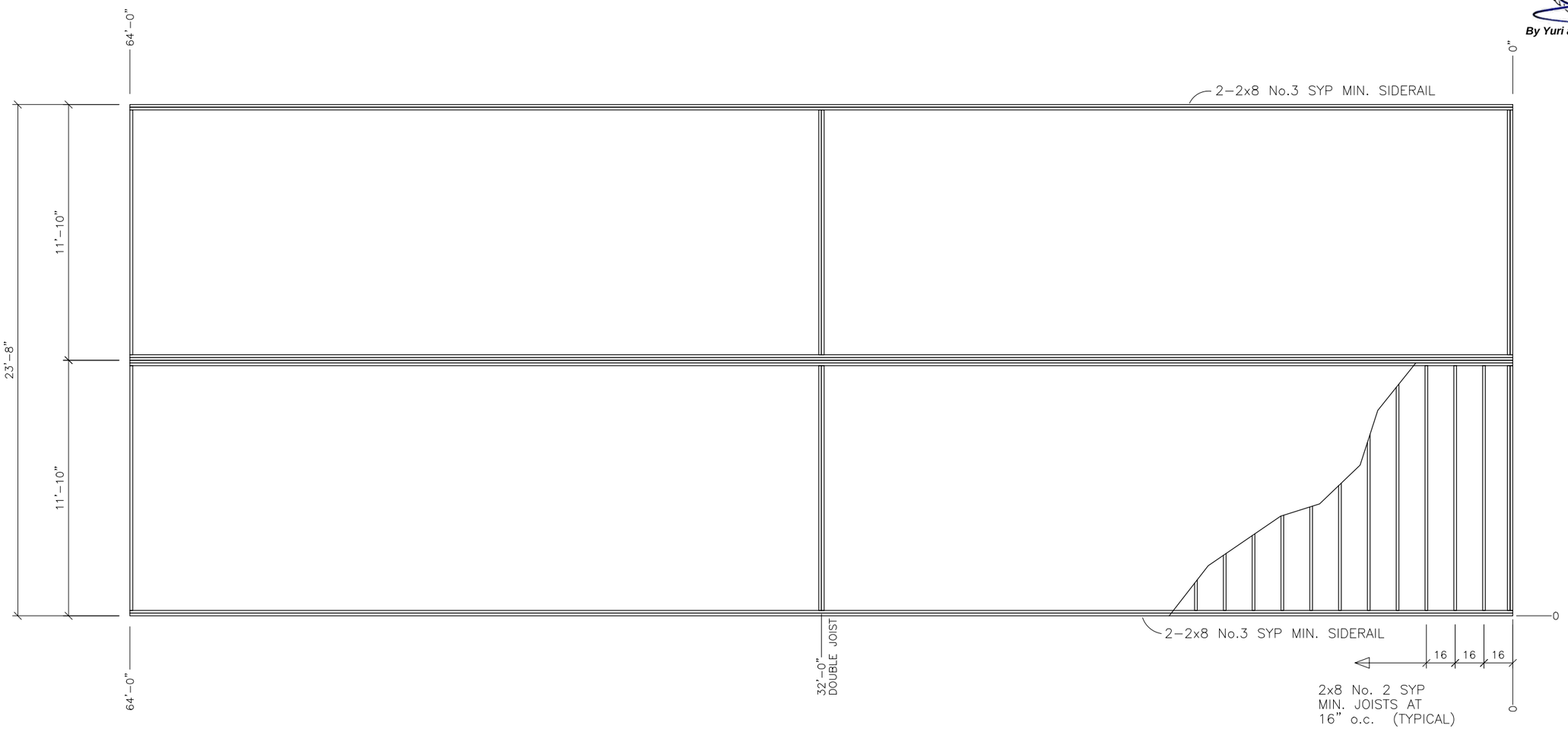
No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 3/16" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: SGD
CHECKED BY:

DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
CHASSIS LAYOUT
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
S-2

P:\PALOMAR\Drawings\2279-80 - Lees Summit\2464 DRY CLASSROOM 2.dwg, 6/11/2020 3:50:36 PM, NMiller



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PROFESSIONAL ENGINEER

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1 FLOOR FRAMING LAYOUT
SCALE: 3/16" = 1'-0"

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 3/16" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: SGD
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DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
FLOOR FRAMING LAYOUT
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
S-3

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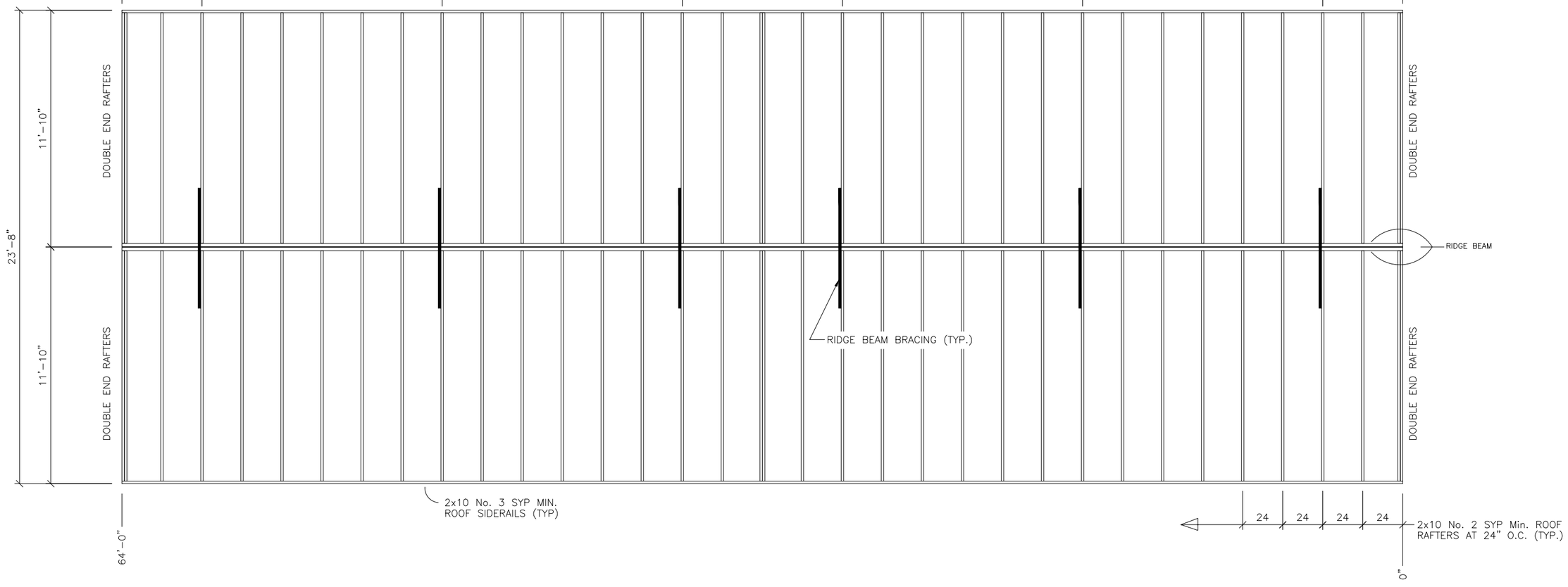

STATE OF MISSOURI
YURIANTO YURIANTO
NUMBER PE-2016009131
PROFESSIONAL ENGINEER

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1 ROOF FRAMING LAYOUT
SCALE: 1/8" = 1'-0"

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 3/16" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: NM
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DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
ROOF FRAMING LAYOUT
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
S-4

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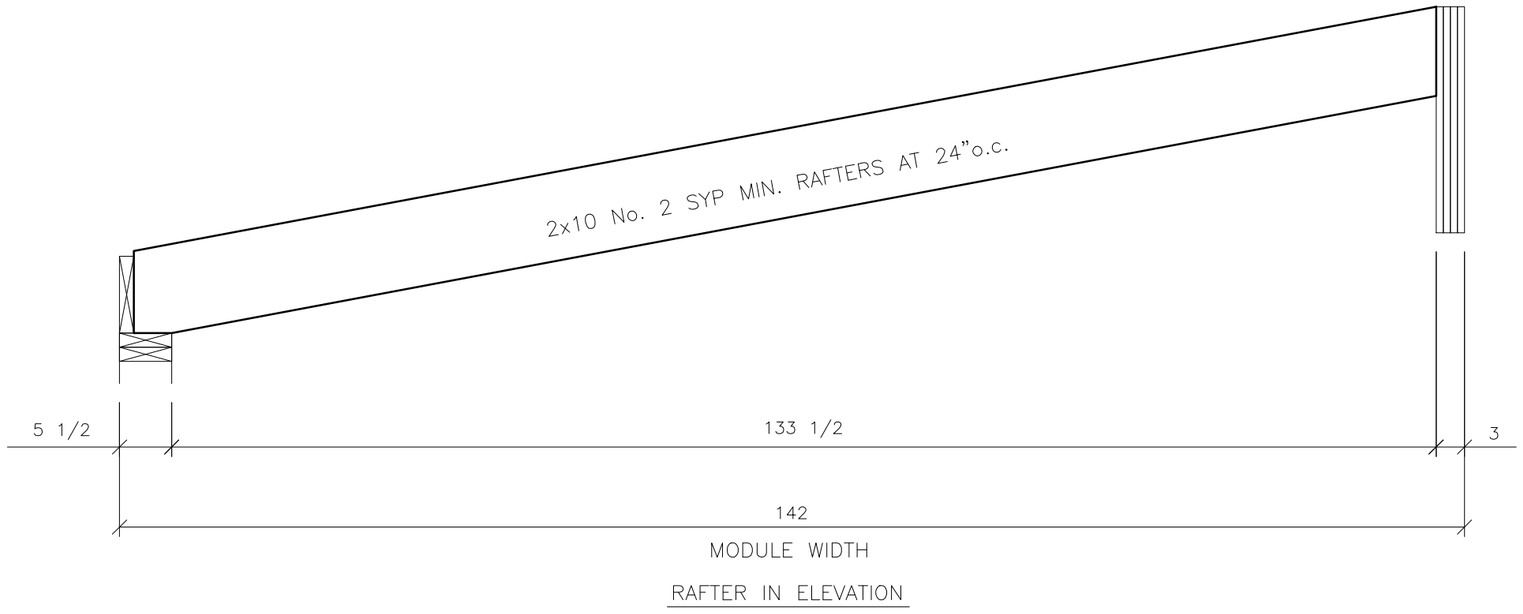
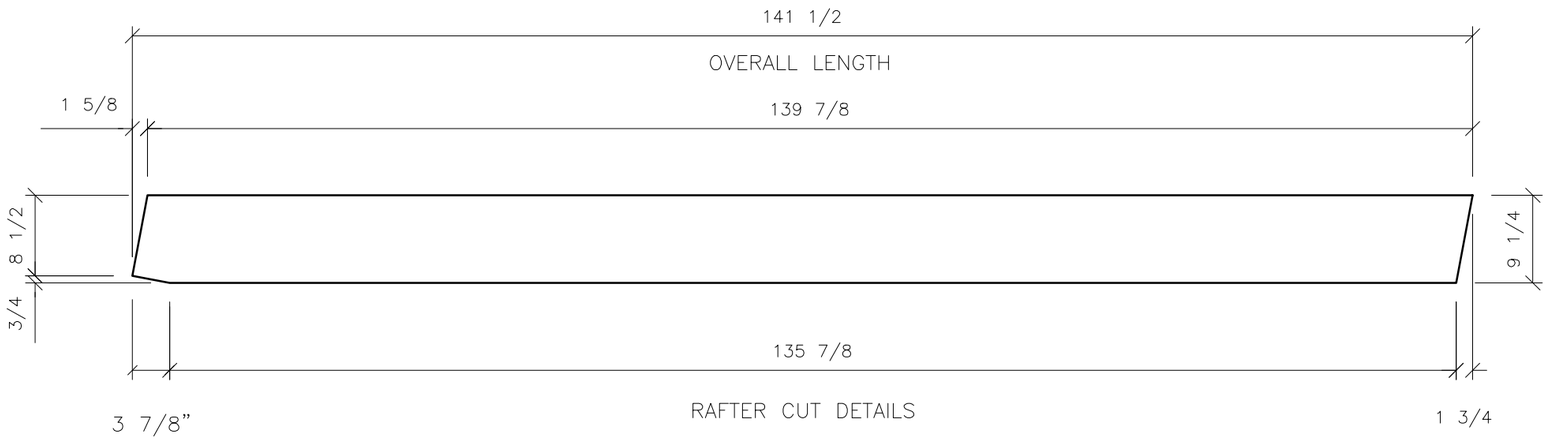


RAFTER IN ELEVATION



RAFTER CUT DETAILS

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STATE OF MISSOURI
YURIANTO YURIANTO
NUMBER PE-2016009131
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By Yuri at 4:20:01 PM, 6/11/2020

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 3/4" = 1'-0"
PLOT SCALE: 1:1
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DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
RAFTER DETAILS
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
S-5

1 RAFTER DETAILS
SCALE: 3/4" = 1'-0"

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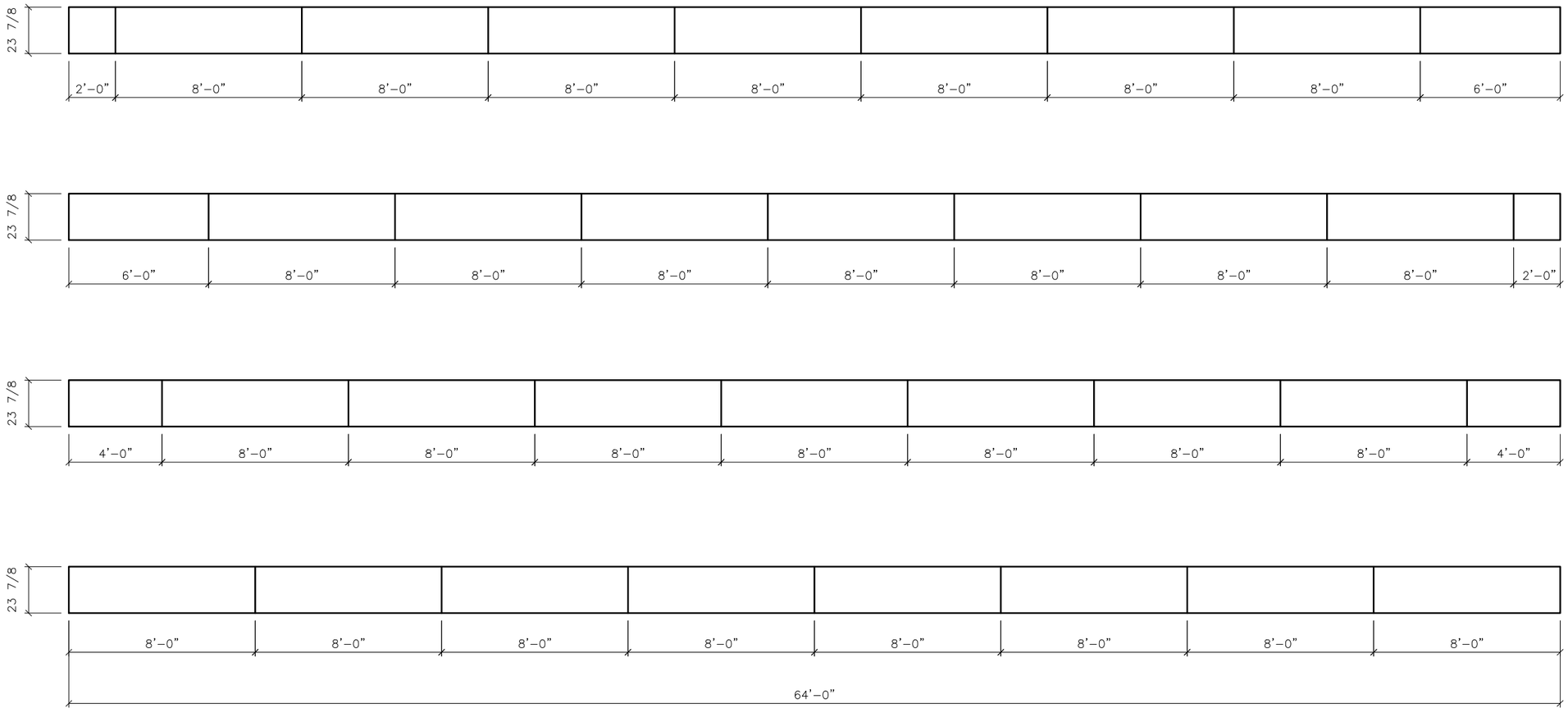

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NOTES:

1. RIDGE BEAM CONSTRUCTION IS SAME FOR BOTH HALVES (MIRRORED)
2. RIDGE BEAM CONSTRUCTION SHALL BE IN ACCORDANCE WITH APA PLYWOOD DESIGN SPECIFICATION, SUPPLEMENT 5, AND SECTION 9 OF THE DESIGN MANUAL, 2008 EDITION.
3. RIDGE BEAM IS CONSTRUCTED WITH 3/4", 5-PLY, 5-LAYER GROUP 1 SPECIES PLYWOOD.

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1 RIDGE BEAM CONSTRUCTION
SCALE: 3/16" = 1'-0"

STATE OF MISSOURI
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NUMBER PE-2016009131
PROFESSIONAL ENGINEER

By Yuri at 4:20:03 PM, 6/11/2020

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 3/16" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: SGD
CHECKED BY:

DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
RIDGE BEAM CONSTRUCTION
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
S-6

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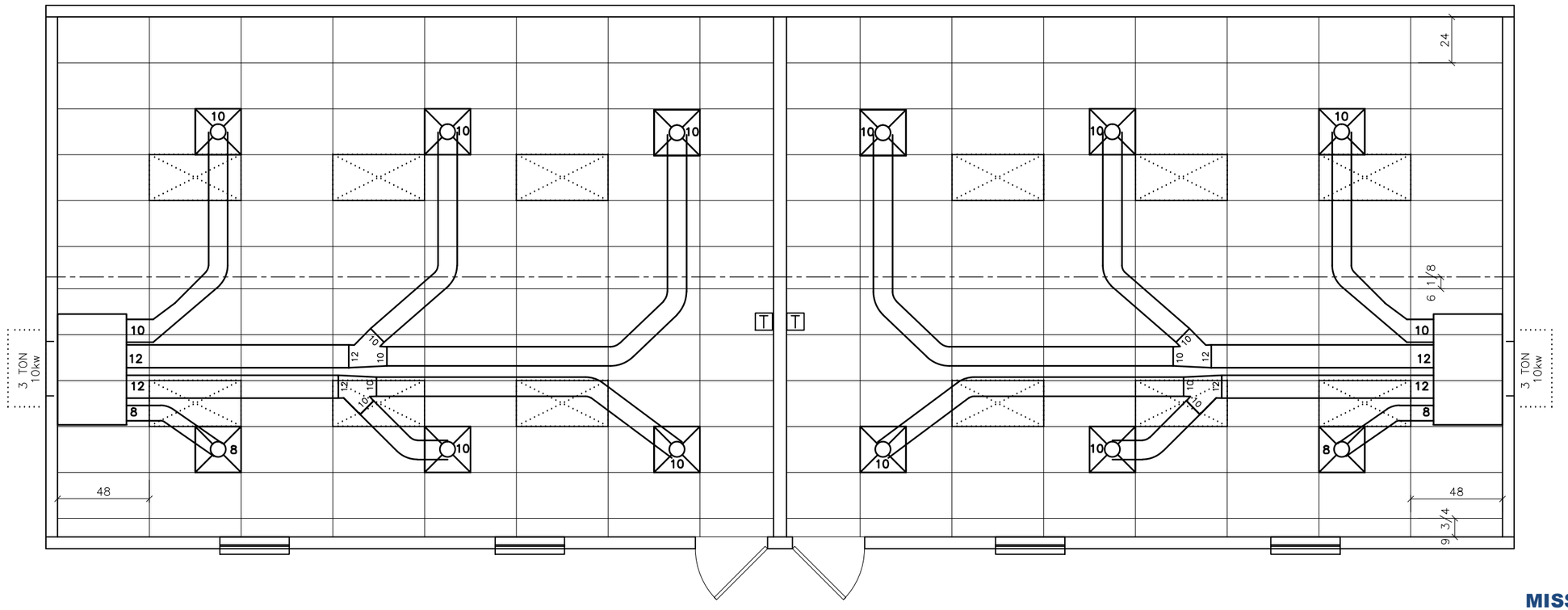

SYMBOL LEGEND	
	2' x 4' LED LIGHT (44 WATTS)
	24"x 24" SUPPLY DIFFUSER
T	PROGAMMABLE THERMOSTAT

NOTE: DUCTING IS CLASS 1, U.L. 181 LISTED FLEXIBLE FIBERGLASS DUCTING.
NOTE: RETURN AIR IS DIRECT TO THE UNIT THROUGH THE WALL.

STATE OF MISSOURI
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NUMBER PE-2016009131
PROFESSIONAL ENGINEER

By Yuri at 4:20:05 PM, 6/11/2020

(Structural Aspects Only)

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1 CEILING GRID / HVAC LAYOUT
SCALE: 1/8" = 1'-0"

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No.	DESCRIPTION	BY	DATE
		RR	2/7

DATE: 6/9/2020
SCALE: 1/8" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: NM
CHECKED BY:

DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
CEILING GRID / HVAC LAYOUT
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
M-1

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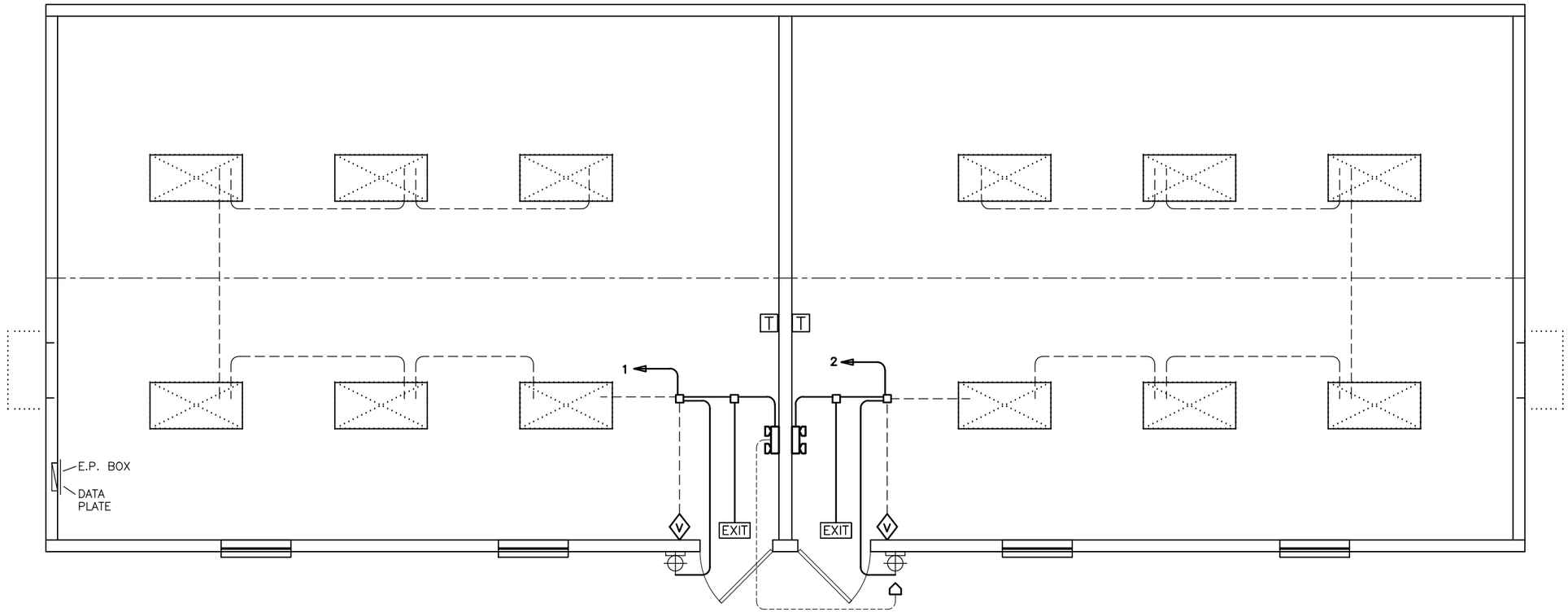

ELECTRICAL SYMBOL LEGEND			
48" x 24" LED LIGHT (44w)	RECEPTACLE	7–DAY PROGRAMMABLE THERMOSTAT w/ OCCUPANT OVERRIDE	JUNCTION BOX
VANDAL–PROOF EXTERIOR LED LIGHT ON PHOTOCELL (22w)	GFI RECEPTACLE	OCCUPANCY SENSOR SWITCH IPV15	ELECTRICAL DIST. PANEL
	TAMPER–RESISTANT RECEPTACLE	PHONE / DATA STUB–IN	LED EXIT LIGHT w/ BATTERY BACK–UP
	WEATHER–PROOF GFI RECEPTACLE		EMERGENCY LIGHT w/ BATTERY BACK–UP & REMOTE HEAD
			EXTERIOR REMOTE HEAD

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Cottage Grove, WI

1 LIGHTING SCHEMATIC
SCALE: 1/8" = 1'-0"

STATE OF MISSOURI
YURIANTO YURIANTO
NUMBER PE-2016009131
PROFESSIONAL ENGINEER
By Yuri at 4:20:06 PM, 6/11/2020

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 1/8" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: NM
CHECKED BY:

DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
LIGHTING SCHEMATIC
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
E-1

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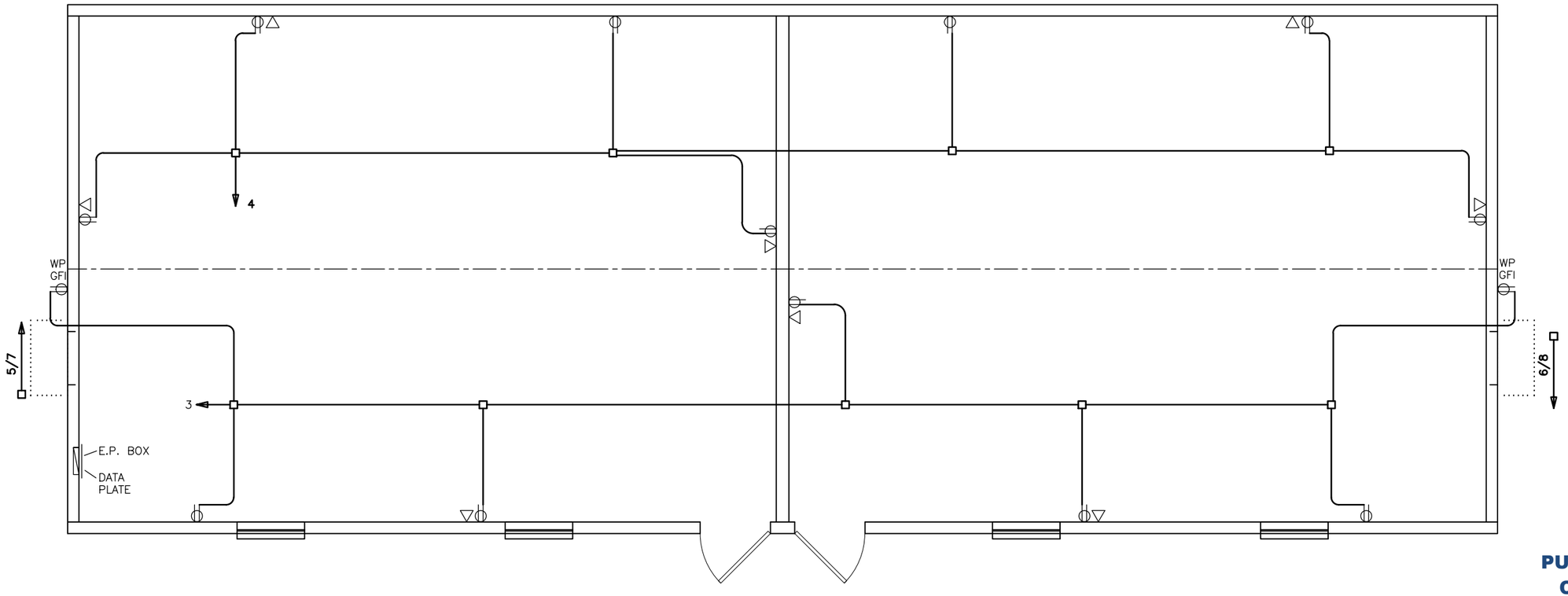

ELECTRICAL SYMBOL LEGEND			
48" x 24" LED LIGHT (44w)	RECEPTACLE	7-DAY PROGRAMMABLE THERMOSTAT w/ OCCUPANT OVERRIDE	JUNCTION BOX
VANDAL-PROOF EXTERIOR LED LIGHT ON PHOTOCELL (22w)	GFI RECEPTACLE	OCCUPANCY SENSOR SWITCH IPV15	ELECTRICAL DIST. PANEL
	TAMPER-RESISTANT RECEPTACLE	PHONE / DATA STUB-IN	LED EXIT LIGHT w/ BATTERY BACK-UP
	WEATHER-PROOF GFI RECEPTACLE		EMERGENCY LIGHT w/ BATTERY BACK-UP & REMOTE HEAD
			EXTERIOR REMOTE HEAD

NOTE:
BUILDING IS: 120/240v 3-WIRE SINGLE PHASE
ELECTRICAL CONDUIT: ELECTRICAL NON-METALLIC TUBING
ELECTRICAL WIRING: MIN. #12 THHN COPPER WITH GROUND
GROUNDING ON SITE: PER 2014 NEC ARTICLE 250-50

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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 1/8" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: NM
CHECKED BY:

DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
POWER DISTRIBUTION SCHEMATIC
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
E-2

1 POWER DISTRIBUTION SCHEMATIC
SCALE: 1/8" = 1'-0"

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MIN WIRE SIZE		150 AMP SINGLE PHASE MAIN BREAKER				PANEL 'A'	MIN WIRE SIZE
12	LIGHTS: LEFT CLASSROOM	20	1	2	20	LIGHTS: RIGHT CLASSROOM	12
12	RECEPTS: LFET CLASSROOM, EXTERIOR	20	3	4	20	RECEPTS: RIGHT CLASSROOM, EXTERIOR	12
6	HVAC UNIT: LEFT CLASSROOM	60	5	6	60	HVAC UNIT: RIGHT CLASSROOM	6
	3-TON / 10 kw	2P	7	8	2P	3-TON / 10 kw	
			9	10	20	FIRE ALARM CONTROL PANEL	12
			11	12			
			13	14			
			15	16			
			17	18			
			19	20			
			21	22			
			23	24			
			25	26			
			27	28			
			29	30			
			31	32			
			33	34			
			35	36			
			37	38			
			39	40			
			41	42			

240 v

LOAD CALC:			150 AMP
QTY	ITEM		WATTS TOTAL
12	LED Troffer	x	44 660 watts
0	Compact Fluorescent	x	26 0 watts
0	Fluorescent 17w 2 Lamp	x	31 0 watts
2	Ext. CFL Light	x	84 210 watts
0	Exhaust Fan 80 cfm	x	84 0 watts
0	Appliance circuit	x	1920 0 watts
14	Recept Duplex	x	180 2520 watts
0	Recept Dedicated	x	1920 0 watts
0	Recepts Computers Ckts.	x	1500 0 watts
0	Recepts Heat Tape	x	1800 0 watts
0	Water Heater (240v)	x	3000 0 watts
0	Water Cooler	x	370 0 watts
0	Res. Microwave	x	1350 0 watts
0	Res. Microwave	x	1350 0 watts
0	Emergency Light	x	14.4 0 watts
2	Emergency Light	x	14.4 29 watts
2	Exit Sign	x	2.8 7 watts
1	Alarm Panel	x	144 180 watts
2	Bard 3Ton / 10kw (240v)	x	13920 27840 watts
	Air Handler 3 Ton / 10kw (240v)	x	12420 0 watts

Total Watts: 31446
Total Amps: **131.02**

NOTE:
WHERE LEFT OR RIGHT CLASSROOM IS CALLED OUT, THE CALLOUT IS AS VIEWED FROM THE EXTERIOR OF THE BUILDING STANDING AT THE EXTERIOR DOORS.

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200

GROUND BAR	NEUTRAL
WIRE SIZE OF:	**TOTAL PANEL LOAD:**
Service Conductors: 1/0	Total Watts: 31446 watts
Service Ground: 6	Voltage: 240 v
	Total Amps: 131.02 amps

Service Conduit Size for: AWG #3/0 Conductors - 2 Phase and 1 Neutral

IMC, RMC or PVC 1 1/2 Inch

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DATE 6/23/20
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Cottage Grove, WI

STATE OF MISSOURI
YURIANTO YURIANTO
NUMBER PE-2016009131
PROFESSIONAL ENGINEER

By Yuri at 4:20:10 PM, 6/11/2020

(Structural Aspects Only)

YURI YURIANTO
MODULAR STRUCTURAL CONSULTANTS LLC
TX. REG. #: F-15892
9720 COIT RD. STE. 220-150
PLANO, TX. 75025-5833

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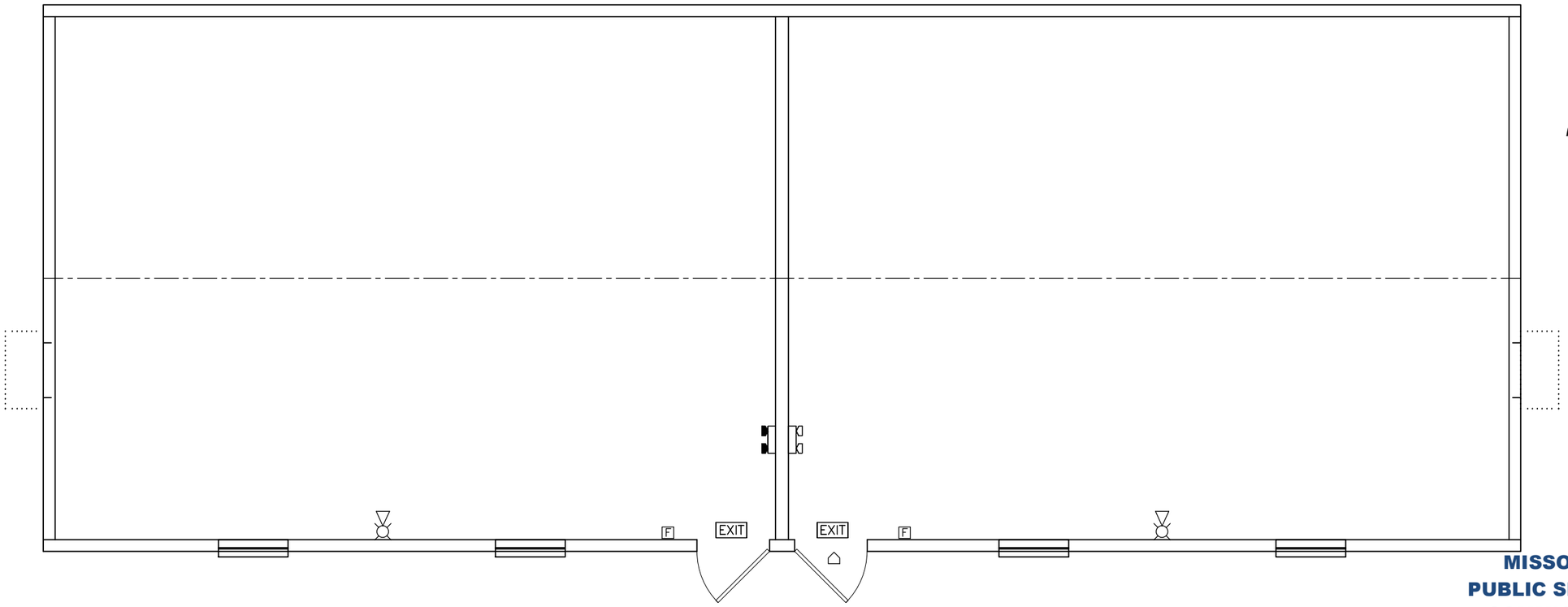
No.	DESCRIPTION	BY	Date

DATE: 6/9/2020
SCALE: N.T.S.
PLOT SCALE: N.T.S.
DRAWN BY: NM
CHECK BY:

ELECTRICAL CALCULATIONS
2464 DRY CLASSROOM BLDG
LEE'S SUMMIT, MO
Dwg. No. 2464 Dry Classroom
S/N: 2279-2280

SHEET No.
E-3



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YURIANTO YURIANTO
NUMBER PE-2016009131
PROFESSIONAL ENGINEER

By Yuri at 4:20:14 PM, 6/11/2020

(Structural Aspects Only)

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07/02/2020

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SYMBOL LEGEND	
EXIT	LIGHTED EXIT SIGN WITH BATTERY BACK-UP
	EMERGENCY LIGHT WITH BATTERY BACK-UP
	EMERGENCY LIGHT WITH BATTERY BACK-UP AND REMOTE HEAD
	EMERGENCY LIGHT REMOTE HEAD
F	ALARM INITIATION DEVICE (PULL STATION) INSTALLED AT 48" A.F.F. TO TOP OF BOX
	ALARM NOTIFICATION APPLIANCE (HORN/STROBE) INSTALLED AT 80" AFF TO BOTTOM OF BOX
	ALARM NOTIFICATION APPLIANCE (HORN/STROBE) INSTALLED AT 80" AFF TO BOTTOM OF BOX

NOTE: FIRE ALARM APPLIANCES AND WIRING ARE NOT INSTALLED BY PALOMAR. BOXES AND CONDUIT ARE PROVIDED AT THE LOCATIONS SHOWN TO FACILITATE THEIR INSTALLATION BY A LICENSED ALARM INSTALLER.

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DATE 6/23/20
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Cottage Grove, WI

1 FIRE ALARM LAYOUT
SCALE: 3/16" = 1'-0"

MODULAR STRUCTURAL CONSULTANTS LLC
9720 COIT RD. STE. 220-150
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PHONE: 972-896-5373
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No.	DESCRIPTION	BY	DATE

DATE: 6/9/2020
SCALE: 3/16" = 1'-0"
PLOT SCALE: 1:1
DRAWN BY: SGD
CHECKED BY:

DRY CLASSROOM BUILDING
LEE'S SUMMIT, MO
FIRE ALARM LAYOUT
2464 DRY CLASSROOM
SERIAL #: 2279-2280

SHEET No.
E-4

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